X-Pedition™ Security Router

XSR-1850

Getting Started Guide

Version 7.5

9033838-07

enterasys™
Networks that Know

Electrical Hazard: Only qualified personnel should perform installation procedures.

Riesgo Electrico: Solamente personal calificado debe realizar procedimientos de instalacion.

Elektrischer Gefahrenhinweis: Installationen sollten nur durch ausgebildetes und qualifiziertes Personal vorgenommen werden.

Notice

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Enterasys Networks, Inc.
50 Minuteman Road
Andover, MA 01810

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Part Number: 9033838-07 July 2005

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Regulatory Compliance Information

Federal Communications Commission (FCC) Notice

The XSR complies with Title 47, Part 15, Class A of FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

NOTE: The XSR has been tested and found to comply with the limits for a class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the XSR is operated in a commercial environment. This XSR uses, generates, and can radiate radio frequency energy and if not installed in accordance with the operator's manual, may cause harmful interference to radio communications. Operation of the XSR in a residential area is likely to cause interference in which case you will be required to correct the interference at your own expense.

WARNING: Modifications or changes made to the XSR, and not approved by Enterasys Networks may void the authority granted by the FCC or other such agency to operate the XSR.

The XSR complies with Part 68 of the FCC rules and the requirements adopted by the Administrative Council for Terminal Attachments (ACTA). A label on the circuit board of the Network Interface Module contains, among other information, a product identifier in the format listed in the following table. If requested, this number must be provided to the telephone company.

Product	Product Identifier
NIM-T1/E1-xx, NIM-CT1E1/PRI-xx	US: 5N5DENANET1
NIM-BRI-U-xx	US: 5N5DENANEBU
NIM-ADSL-AC-xx	US: 5N5DL02NEAA
NIM-DIRELAY-xx	US: 5N5DENANEDI
NIM-TE1-xx, NIM-CTE1-PRI-xx	US: 5N5DENANECT

A plug and jack used to connect the XSR to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by ACTA. Refer to the following table and installation instructions for details.

Product	Jack Used
NIM-T1/E1-xx, NIM-CT1E1/PRI-xx, NIM-DIRELAY-xx, NIM-TE1-xx, NIM-CTE1-PRI-xx	RJ48C
NIM-BRI-U-xx	RJ49C
NIM-ADSL-AC-xx	RJ11C

Codes applicable to this equipment:

Product	Facilities Interface Code (FIC)	Service Order Code (SOC)
NIM-T1/E1-xx, NIM-CT1E1/PRI-xx, NIM-DIRELAY-xx, NIM-TE1-xx, NIM-CTE1-PRI-xx	04DU9.BN, 04DU9.DN, 04DU9.1KN, 04DU9.1SN	6.0N
NIM-BRI-U-xx	02IS5	6.0N
NIM-ADSL-AC-xx	02LS2	7.0Y

If the XSR harms the telephone network, the telephone company will notify you in advance that it may need to temporarily discontinue service. But if advance notice is not practical, the telephone company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the XSR. If this happens, the telephone company will provide advance notice for you to make necessary modifications and maintain uninterrupted service.

If you experience trouble with the XSR, for repair or warranty information, please contact Enterasys Networks, Inc., at 978-684-1000. If the XSR is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is solved. The XSR is not intended to be repaired by the customer.

Industry Canada Notices

This digital apparatus does not exceed the class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Equipment Attachments Limitations

"NOTICE: The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas. Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate."

"NOTICE: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the ringer equivalence Numbers of all the devices does not exceed 5."

R & TTE Directive Declaration

Hereby, Enterasys Networks, Inc. declares that this XSR-1850 X-Pedition Security Router is compliant with essential requirements and other relevant provisions of Directive 1999/5/EC.

Class A ITE Notice

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Clase A. Aviso de ITE

ADVERTENCIA: Este es un producto de Clase A. En un ambiente doméstico este producto puede causar interferencia de radio en cuyo caso puede ser requerido tomar medidas adecuadas.

Klasse A ITE Anmerkung

WARNHINWEIS: Dieses Produkt zählt zur Klasse A (Industriebereich). In Wohnbereichen kann es hierdurch zu Funkstörungen kommen, daher sollten angemessene Vorkehrungen zum Schutz getroffen werden.

Product Safety

This product complies with the following: UL 60950, CSA C22.2 No. 60950, 73/23/EEC, EN 60950, EN 60825, IEC 60950.

Use the XSR with the Advanced Power Solutions (APS61ES-30) power supply included with the branch router. Enterasys Networks strongly recommends that you use only the proper type of power supply cord set for the XSR. It should be a detachable type, UL listed/CSA certified, type SJ or SJT, rated 250 V minimum, 7 amp with grounding-type attachment plug. Maximum length is 15 feet (4.5 meters). The cord set should have the appropriate safety approval for the country in which the equipment will be installed.

Seguridad del Producto

El producto de Enterasys cumple con lo siguiente: UL 60950, CSA C22.2 No. 60950, 73/23/EEC, EN 60950, EN 60825, IEC 60950.

Produktsicherheit

Dieses Produkt entspricht den folgenden Richtlinien: UL 60950, CSA C22.2 No. 60950, 73/23/EEC, EN 60950, EN 60825, IEC 60950.

Electromagnetic Compatibility (EMC)

This product complies with the following: 47 CFR Parts 2 and 15, CSA C108.8, 89/336/EEC, EN 55022, EN 55024, EN 61000-3-2, EN 61000-3-3, AS/NZS CISPR 22, and VCCI V-3.

Compatibilidad Electromágnetica (EMC)

Este producto de Enterasys cumple con lo siguiente: 47 CFR Partes 2 y 15, CSA C108.8, 89/336/EEC, EN 55022, EN 55024, EN 61000-3-2, EN 61000-3-3, AS/NZS CISPR 22, VCCI V-3.

Elektro- magnetische Kompatibilität (EMC)

Dieses Produkt entspricht den folgenden Richtlinien: 47 CFR Parts 2 and 15, CSA C108.8, 89/336/EEC, EN 55022, EN 55024, EN 61000-3-2, EN 61000-3-3, AS/NZS CISPR 22, VCCI V-3.

European Waste Electrical and Electronic Equipment (WEEE) Notice

In accordance with Directive 2002/96/EC of the European Parliament on waste electrical and electronic equipment (WEEE):

1. The symbol above indicates that separate collection of electrical and electronic equipment is required and that this product was placed on the European market after August 13, 2005, the date of enforcement for Directive 2002/96/EC.
2. When this product has reached the end of its serviceable life, it cannot be disposed of as unsorted municipal waste. It must be collected and treated separately.
3. It has been determined by the European Parliament that there are potential negative effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment.
4. It is the users' responsibility to utilize the available collection system to ensure WEEE is properly treated.

   For information about the available collection system, please go to http://www.enterasys.com/support/ or contact Enterasys Customer Support at 353 61 705586 (Ireland).

VCCI Notice

This is a class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI) V-3. If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

この装置は，情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

BSMI EMC Statement — Taiwan

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種請況下，使用者會被要求採取某些適當的對策。

Declaration of Conformity

Application of Council Directive(s):	**89/336/EEC** **73/23/EEC**
Manufacturer's Name:	**Enterasys Networks, Inc.**
Manufacturer's Address:	**50 Minuteman Road** **Andover, MA 01810** **USA**
European Representative Address:	**Enterasys Networks, Ltd.** **Nexus House, Newbury Business Park** **London Road, Newbury** **Berkshire RG14 2PZ, England**
Conformance to Directive(s)/Product Standards:	**EC Directive 89/336/EEC** **EN 55022** **EN 55024** **EC Directive 73/23/EEC** **EN 60950** **EN 60825**
Equipment Type/Environment:	**Networking Equipment, for use in a Commercial or Light Industrial Environment.**

Enterasys Networks, Inc. declares that the equipment packaged with this notice conforms to the above directives.

Australian Telecom

N826

WARNING: Do not install phone line connections during an electrical storm.

WARNING: Do not connect phone line until the interface has been configured through local management. The service provider may shut off service if an un-configured interface is connected to the phone lines.

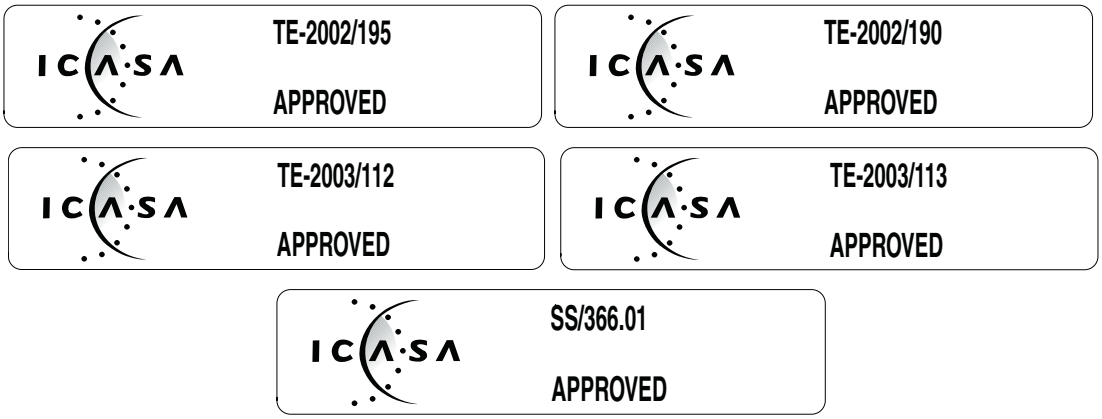
WARNING: The NIM-BRI-ST cannot be connected directly to outside lines. An approved channel service unit (CSU) must be used for connection to the ISDN network. In some areas this CSU is supplied by the network provider and in others it must be supplied by the user. Contact your service provider for details.

Federal Information Processing Standard (FIPS) Certification

The XSR has been submitted to the National Institute of Standards and Technology (NIST) for FIPS 140-2 certification and is now officially listed on the NIST pre-validation list. For more information about the FIPS validation program, go to http://csrc.nist.gov/cryptval/preval.htm. For the FIPS 140-1 and 140-2 Pre-Validation List, click on the **[PDF]** link at the top of the page.

Independent Communications Authority of South Africa

This product complies with the terms of the provisions of section 54(1) of the Telecommunications Act (Act 103 of 1996) and the Telecommunications Regulation prescribed under the Post Office Act (Act 44 of 1958).



VPN Consortium Interoperability

The VPN Consortium's (VPNC) testing program is an important source for certification of conformance to IPSec standards. With rigorous interoperability testing, the VPNC logo program provides IPSec users even more assurance that the XSR will interoperate in typical business environments. VPNC is the only major IPSec testing organization that shows both proof of interoperability as well as the steps taken so that you can reproduce the tests.

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Preface

This guide provides a general overview of the XSR-1850 hardware and software features and describes how to quickly install and configure the XSR. Refer to the *XSR-1850 CLI Reference Guide* and *XSR-1850 User's Guide* for information not contained in this document.

This guide is written for administrators who want to configure the X-Pedition Security Router or experienced users who are knowledgeable of basic networking principles.

This chapter details the following:

- Contents of the Guide
- Conventions Used in This Guide
- Getting Help

Contents of the Guide

Information in this guide is arranged as follows:

- *Chapter 1, Overview,* introduces key features of the XSR and briefly describes hardware installation.
- *Chapter 2, Hardware Installation*, provides a checklist to verify your shipment and describes how to install XSR hardware including NIM and CompactFlash cards, the optional external power supply, and rack-mounting kit.
- *Chapter 3, Software Configuration,* describes how to initiate and quickly configure the XSR. It also details how to add an interface and subnet mask; set passwords SNMP, DNS and SYSLOG server values; set up Remote Auto Install; configure the firewall feature set, upgrade system image and Boot PROM software; consult system statistics, and save configuration changes.
- *Appendix A, Specifications*, outlines hardware specifications including information about: the processor, interfaces, system memory, chassis, power supply, interfaces, required cabling and other accessories, pinout assignments for WAN and LAN interfaces, and LED behavior.

Conventions Used in This Guide (Convenciones Usadas en Esta Guía)

The following conventions are used in this guide (Las siguientes convenciones son usadas en esta guía):

Note: Calls the reader's attention to any item of information that may be of special importance.

Nota: Llama la atencion del lector a cierta información que puede ser de especial importancia.

Caution: Contains information essential to avoid damage to the equipment.

Precaución: Contiene información esencial para prevenir dañar el equipo.

Achtung: Verweißt auf wichtige Informationen zum Schutz gegen Beschädigungen.

Electrical Hazard: Warns against an action that could result in personal injury or death due to an electrical hazard.

Riesgo Electrico: Advierte contra una acción que pudiera resultar en lesión corporal o la muerte debido a un riesgo eléctrico.

Elektrischer Gefahrenhinweis: Installationen sollten nur durch ausgebildetes und qualifiziertes. Personal vorgenommen werden.

Warning: Warns against an action that could result in personal injury or death.

Advertencia: Advierte contra una acción que pudiera resultar en lesión corporal o la muerte.

Warnhinweis: Warnung vor Handlungen, die zu Verletzung von Personen oder gar Todesfällen führen können!

Bold/En negrilla	Text in boldface indicates values you type using the keyboard or select using the mouse (for example, a:\setup). Default settings may also appear in bold. El texto en negrilla indica valores que usted introduce con el teclado o que selecciona con el mouse (por ejemplo, a:\setup). Las configuraciones default pueden también aparecer en en negrilla.
Italics/It áli ca	Text in italics indicates a variable, important new term, or the title of a manual. El texto en itálica indica un valor variable, un importante nuevo término, o el título de un manual.
SMALL CAPS/ MAYUSCULAS	Small caps specify the keys to press on the keyboard; a plus sign (+) between keys indicates that you must press the keys simultaneously (for example, CTRL+ALT+DEL). Las mayusculas indican las teclas a oprimir en el teclado; un signo de más (+) entre las teclas indica que usted debe presionar las teclas simultáneamente (por ejemplo, CTRL+ALT+DEL).
`Courier font/` `Tipo de letra Courier`	Text in this font denotes a file name or directory. El texto en este tipo de letra denota un nombre de archivo o de directorio.
+	Points to text describing CLI command. Apunta al texto que describe un comando de CLI.
FastEthernet	FastEthernet and GigabitEthernet references are generally interchangeable throughout this guide. Las referencias a los terminos FastEthernet y GigabitEthernet son generalmente intercambiables en el contenido de esta guia.

Getting Help

For additional support related to the XSR, contact Enterasys Networks by one of these methods:

World Wide Web	**http://www.enterasys.com**
Phone	(978) 684-1000 1-800-872-8440 (toll-free in U.S. and Canada) For the Enterasys Networks Support toll-free number in your country: **http://www.enterasys.com/support/gtac-all.html**
Internet mail	support@enterasys.com To expedite your message, please type **[xsr]** in the subject line.
FTP	ftp://ftp.enterasys.com
Login	anonymous
Password	your Email address
Acquire the latest image and Release Notes	**http://www.enterasys.com/download**
Additional documentation	**http://www.enterasys.com/support/manuals**
Forward comments or suggestions	**techpubs@enterasys.com** To expedite your message, include the document Part Number in the Email.

Before contacting Enterasys Networks for technical support, have the following information ready:

- Your Enterasys Networks service contract number
- A description of the failure
- A description of any action(s) already taken to resolve the problem (e.g., rebooting the unit, reconfiguring modules, etc.)
- The serial and revision numbers of any associated Enterasys Networks products in the network
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of the problem
- The XSR's history (i.e., have you returned the device before, is this a recurring problem, etc.)
- Any previous Return Material Authorization (RMA) numbers

1

Overview

This chapter introduces key features of the XSR-1850 and briefly describes hardware installation.

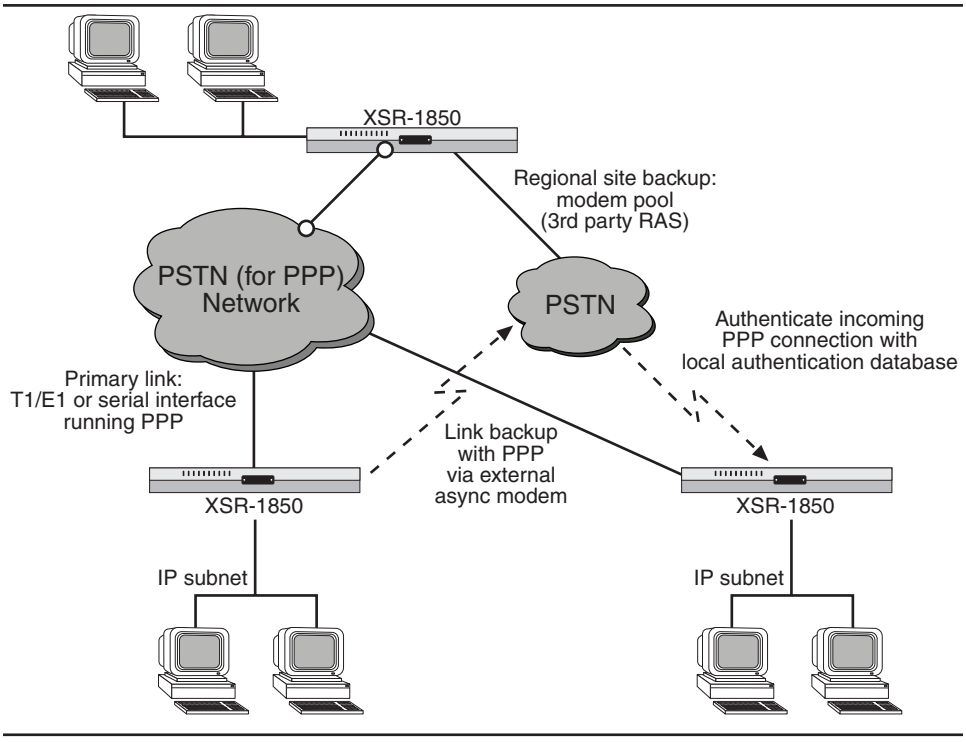
System Description

The XSR is a desktop networking device designed for enterprise branch offices that provides IP routing over FastEthernet LAN and T1/E1, Serial (RS232, X.21, V.35, RS422/530, RS449), Dial Services via POTS, ISDN (BRI, PRI), or Frame Relay WAN connections. Virtual Private Network (VPN) and Firewall support is also provided in Site-to-Site or Remote Access applications.

The router can be managed using the Command Line Interface (CLI) and monitored using SNMP v1, v2c/v3 (with standard MIB-II and proprietary MIB support). The XSR also provides Web access to display device information.

A typical deployment of the XSR might be in two branch offices connected to a regional office, as illustrated in Figure 1-1. In this example, one XSR with its associated sub-network has an E1/T1 or high-speed serial WAN connection as its primary link to the Public Service Telephone Network (PSTN) with an asynchronous modem connection in a backup capacity.

Figure 1-1 Typical XSR-1850 Topology

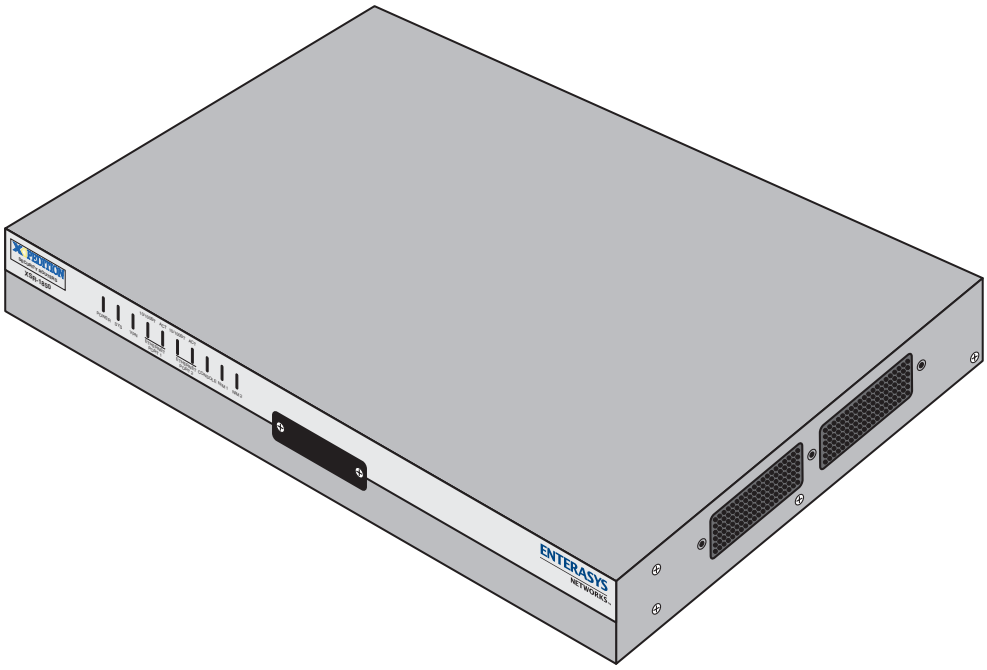


Hardware Features

The semi-modular XSR, shown in Figure 1-2, comes equipped with the following features:

- Standard 1.5U chassis (2 1/16" high by 17" wide by 10" deep) that you can mount in a standard 19" rack.
- One internal 90 - 265 VAC power supply with country-specific line cords. Optionally, an external power supply and cord is available.
- IBM PowerPC 405GP embedded processor (440 MIPS) with integrated memory controller.

Figure 1-2 XSR-1850



- Two Network Interface Module (NIM) slots for these optional cards:
  - 1, 2, or 4 full, fractional and channelized T1/E1 WAN NIM with integral CSU/DSU or Primary Rate Interface (PRI) ports (RJ-48C).
  - 1-port T3/E3 channelized/unchannelized WAN NIM with BNC ports. This NIM is also available with up to 16 T1/E1 tributaries and system synchronizaton of two NIMs.
  - High-speed serial port for up to 230 Kbps asynchronous and 8 Mbps synchronous WAN NIM for leased and dial lines (68-pin serial) with universal connector supporting X.21, V.35, RS422 and EIA530.
  - 1- or 2-port serial Basic Rate Interface (BRI) WAN NIM for S/T (RJ-45) or U ports (RJ-49C).
  - 1-port Annex A (POTS)/C or B (ISDN) ADSL WAN NIMs with RJ-11 connector with CompactFlash card.
  - 2-port T1/E1 Drop and Insert WAN NIM with RJ-45 connectors.
  - 1-port Copper or Fiber Ethernet LAN or WAN NIM with an RJ-45 or MT-RJ multi-mode interface.

Note: The third NIM card slot is not used at this time.

- Two 10/100BaseT FastEthernet LAN connectors.
- Console interface including modem control signals for remote debugging, out-of-band configuration or dial backup.
- 64 MBytes of SDRAM/DIMM memory upgradable to 128 MBytes, 8 MBytes of Onboard Flash, and 8, 16, 32, or 64 Mbyte optional, plug-in CompactFlash card.
- VPN accelerator for encryption/decryption (DES/3DES), Message Digest (MD-5, SHA-1) and public key acceleration.
- Alarm detection, local and remote loopback, and loopback tests.
- 10 diagnostic LEDs which show port and system status as well as inform you that a Flash upgrade is in progress.
- Two fans with failure detection capability.

Software Features

The XSR provides the following software features:

Industry-common CLI

- Configuration, performance (status/statistics), and fault (traps/events) management
- Multiple administrators can log into the XSR simultaneously through terminal or remote Telnet/SSHv2 access
- Maximum of five simultaneous Telnet/SSHv2 sessions
- CLI script downloads for bulk configuration
- Alarm/event view and retrieval
- Diagnostic/debug reports and statistics
- Multiple user privilege settings per configuration mode

IP Protocol

- Address Resolution Protocol (ARP)
- Internet Control Message Protocol (ICMP}
- Transmission Control Protocol/User Datagram Protocol (TCP/UDP)
- Dynamic Host Configuration Protocol (DHCP)
- Network Address Translation (NAT) & NAPT
- Dynamic NAT pool based on source and destination
- Dynamic NAT pool with overload
- NAT Port Forwarding
- PAT (NAPT) based on port source and destination

- Telnet & TFTP for device management and configuration
- Debugging tools Ping & TraceRoute
- Secondary IP addressing
- PPP and OSPF debugging
- Internet Group Management Protocol (IGMP)
- Remote Auto Install over Ethernet
- Simple Network Time Protocol (SNTP) server
- OS fallback

IP Routing

- Static and multiple routes to the same destination
- Redistribution of routes from RIP, OSPF, BGP, connected, or static into RIP, OSPF, and BGP
- RIP-1 & RIP-2
- Open Shortest Path First Protocol (OSPF)
- OSPF over Generic Routing Encapsulation (GRE): RFC-2784
- Virtual Router Redundancy Protocol (VRRP)
- Configurable administrative distance (route preference) per protocol for RIP, OSPF and BGP, and per route for static routes
- DNS Proxy (forwarding proxy server)
- Virtual Local Area Networks (VLAN) IEEE 802.1Q
- VLAN Routing including priority support
- Policy Based Routing
- Border Gateway Protocol Version 4 (BGP-4)
- BGP configurable timers and filter tags
- Protocol Independent Multicast - Sparse Mode (PIM-SM)
- Multicast Forwarding over GRE
- Equal-Cost Multi-Path Protocol (ECMP)

SNMP and Statistics Gathering

- Gathering XSR statistics and monitoring using SNMP v1/v2c/v3 using proprietary and standard MIBs including MIB-II Syslog, Configuration Change, TimedReset, Entity, Chassis, Persistence, and Protocol MIBs (OSPF, RIP, FR, and PPP).
- Up/download files to the XSR with the Configuration Management MIB.
- Configure and monitor the XSR using proprietary MIBs: Enterprise VPN and Firewall Configuration, and Host Resources (CPU utilization) via NetSight Atlas Router Services Manager.
- Configuration checksum via MIB
- SNMP Inform support

- Service Level Agreement (SLA) agents
- SNMP-TFTP on-the-fly running configuration
- Hostname in the Syslog message header
- Multiple Syslog servers

Security

- Stateful inspection firewall engine
- FTP, H.323, and RPC (SUN and Microsoft) ALG support
- Application commands for FTP, SMTP, & HTTP
- Firewall logging and authentication
- Firewall interaction with NAT & VPN
- Standard and Extended Access Control Lists
- Denial of Service (DoS) protection
- AAA for firewall, Console, Telnet, SSHv2, PPP and VPN users
- AAA per-interface configuration
- AAA debugging
- Dynamic Firewall configuration
- Onboard URL filtering

PPP

- Sync and asynchronous communications modes accepted
- Authentication of peer entities via Password Authentication Protocol (PAP)
- Challenge Handshake Authentication Protocol (CHAP)
- Microsoft Challenge Handshake Authentication Protocol (MS-CHAP)
- IP Address can be assigned from remote device, and the device will support IP address assignment to a remote device. Pools can be configured locally or from a separate server (DHCP).
- Multilink PPP (MLPPP): RFC-1990
- Multi-Class MLPPP: RFC-2686
- Point-to-Point Protocol over Ethernet (PPPoE) and sub-interface monitoring
- Remote Auto Install over PPP

Frame Relay

- DTE support for User Network Interface (UNI) over Frame Relay PVC connections
- 10-bit DLCI addressing using a 2-byte DLCI header
- Per DLCI IP QoS support

- Rate enforcement (CIR) with automatic rate fallback via traffic/adaptive shaping when the network is congested. Automatically restores normal rates when congestion removed
- Congestion control: Backward and Forward Explicit Congestion Notification (BECN/FECN)
- Standard LMIs: ILMI, ANSI Annex D, CCITT Annex A and:
  - *Auto* option for LMI detection/adaptation
  - *None* option for directly connecting XSRs
- Periodic Keep-Alive messages to learn of connection problems
- Multi-protocol interconnect over Frame Relay - RFC-2427
- RFC-2390 Frame Relay Inverse ARP to discover IP address of remote peer when used in multi-point mode and responds to incoming Inverse ARP requests independent of P2P or MP2P
- Multiple logical interfaces over the same physical Frame Relay port: sub-interfaces
- Quality of Service: standard FIFO queuing, or IP QoS on DLCIs.
- Max PDU size of 1600 bytes
- Traffic shaping
- Frame Relay Fragmentation Implementation Agreement (FRF.12)
- Data Communications Equipment (DCE) support
- Frame Relay over ISDN
- Remote Auto Install over Frame Relay

Dynamic Host Configuration Protocol (DHCP)

- Temporary or permanent network (IP) address allocation to clients
- Network configuration parameter assignment to clients
- Persistent storage/database of network values for network clients - Bindings Database
- Persistent storage of network client lease states kept across reboot
- Persistent and user-controllable conflict avoidance to prevent duplicate IP address including configurable ping checking
- Visibility of DHCP network activity and leases through operator reports statistics and logs
- DHCP Client

Integrated Services Digital Network (ISDN) - BRI/PRI

- Circuit Mode Data (CMD): Channels (DS0s) are switched by the CO to the destination user for the duration of the call
- Outgoing calls supported for Backup, DoD/BoD
- Incoming calls routed to the correct protocol stack based on called number/sub-address and calling number/sub-address
- Permanent B-channel support, i.e. 64 or 128 kbps lease line. Each BRI port can be set for CMD or Leased-Line mode of operation
- BRI supported switches: ETSI

- BRI: TEI auto-negotiated
- Q.921/Q.931 (Layer 2/Layer 3) configuration is set automatically by selection of switch type
- PRI supported switches: ETSI, NI, DMS100, NTT
- PRI: Handling restart and maintenance modes automatically set
- PRI: Fixed TEI to 0
- ISDN switched and Leased Line connections
- Bandwidth optimization (BoD) & Dial on Demand (DoD)
- Bandwidth Allocation Protocol (BAP)
- Security: PAP/CHAP
- Call monitoring
- Multilink PPP (MLPPP)
- Per call activation for NTT switches
- Frame Relay over ISDN

Quality of Service (QoS)

- Traffic classification using IP Precedence and DiffServ Code Point (DSCP) bits, and multiple-field (L3, L4 and other headers) inspection. *Match-any* and *match-all* options also define a class-map.
- Priority Queuing or Class-based Weight Fair Queueing (CBWFQ) to specify the policy-map
- Random and Weighted Early Detection (RED/WRED) and Tail Drop congestion avoidance
- QoS over VPN
- QoS on Input

Virtual Private Network (VPN)

- Site-to-Site application
  - 200 tunnels with standard 64-Mbyte DIMM
  - IPSec/IKE with pre-shared secrets
  - IPSec/IKE with Certificates (PKI)
  - EZ-IPsec with PKI or pre-shared secrets:
  - Network Extension Mode (NEM)
  - Client mode
- Remote Access application
  - 200 tunnels with standard 64-Mbyte DIMM installed
  - L2TP/IPSec protocols

  – Certificate and PKI environment

    MS-ChapV2, EAP user authentication:

    Username/Password (local database & RADIUS)

SecurID (third-party plug-in)

Certificates (embedded/smart cards) – Microsoft only

– PPTP protocol

MS-ChapV2, EAP user authentication

Local Database & RADIUS

SecurID (third-party plug-in)

Certificates (embedded/smart cards) – Microsoft only

- Encryption
  - Advanced Encryption Standard (AES), Triple Data Encryption Standard (3DES), Data Encryption Standard (DES)
  - 3DES/DES acceleration
- Data Integrity
  - MD5 & SHA-1 algorithms
- Internet Protocol Security (IPsec)
  - Encapsulating Security Payload (ESP), Authentication Header (AH) & IPComp
  - Tunnel & Transport mode
  - Diffie-Hellman Groups 1 & 2
  - Mode Config for IP address assignment
  - NAT Traversal via UDP encapsulation
- Public Key Infrastructure (PKI)
  - Microsoft, Verisign Certificate Authority (CA) support
  - Simple Certificate Enrollment Protocol (SCEP)
  - Chained CA support
  - CRL checking (Hypertext Transfer Protocol [HTTP] & Lightweight Directory Access Protocol (LDAP)
- Network Address Translation (NAT)
  - Static NAT, on the interface and port-forwarded static NAT
  - PAT (NAPT) by port source and destination address
  - Dynamic NAT by source/destination IP address
  - Dynamic NAT pool mapping with overload
  - PPTP/GRE ALG and arbitrary IP address for NAPT
  - Multiple NATs on an interface
- Dynamic Host Configuration Protocol (DHCP)
  - DHCP Server
- OSPF over VPN
- DF Bit override

GRE over IPSec

- ToS bit preservation
- IP helper on VPN interfaces
- IETF/Microsoft-compatible NAT traversal for L2TP
- QoS over VPN

Asynchronous Digital Subscriber Line (ADSL)

- POTS and ISDN circuit support
- ATM Frame UNI (FUNI) data framing format
- OAM cells: AIS, RDI, CC, Loopback over F4 and F5 flows
- Up to 30 ATM Permanent Virtual Circuits (PVCs)
- ATM UBR traffic class
- ATM Adaption Layers 0, 5
- PDU encapsulation types:
  - PPP over ATM (PPPoA) (routed)
  - IP over ATM (routed)
  - PPP over Ethernet over ATM (PPPoE) (routed)
- Responds to inverse ARP requests
- Maintenance of SNMP Interface and Interface Stack tables
- Remote Auto Install over ADSL

Dial Service

- Asynchronous serial support through an external modem
- Synchronous serial
- Outbound calling
- Unnumbered Interface Addressing
- PPP encapsulation
- Authentication from XSR's database for PAP & CHAP
- Dialer profile support
- Configurable redialer
- ISDN callback
- Dialer watch
- Dialer interface spoofing
- Incoming call support for analog modems

Dial Backup

- IP Interfaces backup

Dial-on-Demand/Bandwidth-on-Demand (DoD/BoD)

- PPP Point-to-Multipoint & Multi-to-Multipoint connections
- MLPPP Point -to-Multipoint & Multi-to-Multipoint connections
- Incoming Call Mapping connections
- Switched PPP Multilink connections
- Backup using ISDN & MLPPP connections
- Dialer interface spoofing
- Dialer watch

Installation Overview

Installing the XSR consists of performing the following general steps. For detailed instructions, refer to *Chapters 2* and *3* of this manual.

1. Unpack the XSR from the shipping box. Remove accessories.

   Items included in the shipping box are shown in Chapter 2 of this manual. If you are missing any of these items, contact your authorized Enterasys Networks reseller or Enterasys Networks Customer Support as described in the *Quick Start Guide.*

   Cabling is not supplied with the XSR. Refer to page A-1 for part numbers and contact your Enterasys Networks sales representative.
2. Install any optional memory component.
3. Install NIM cards.
4. Mount the XSR in a standard 19” rack.
5. Connect Ethernet cable(s) to the FastEthernet LAN port(s).
6. Do one or more of the following:
   - Connect a NIM cable, attaching one end to the RJ-xx port on the XSR and the other to a network connector/hub.
   - Connect the serial cable to the High Speed serial port, attaching one end to the 68-pin, SCSI III type connector on the XSR and the other end to a network device.
   - Connect all other NIM cables.
7. Connect the Console serial cable, attaching the female end to the Console port of the XSR and the other end to the DB-9 serial port on your terminal or PC.
8. Connect the appropriate end of the country-specific power cord to the AC Inlet/ Switch at the back of the XSR and plug the other end into a wall socket. If you purchased the optional external power supply, plug this equipment into a wall socket.

Once the XSR is connected, you can begin software configuration, which is described in “Software Configuration” on page 3-1.

2

Hardware Installation

Introduction

This chapter provides a checklist to verify your shipment, suggestions for the installation site, and describes how to install the following XSR hardware:

- NIM cards
- Connecting cables
- Optional - CompactFlash card
- Optional - Redundant power supply(s), passive power chassis and harness

Note: For instructions on installing a balun and grounding shunt/terminal strip on E1 NIM cards only, refer to *Appendix A: Specifications* on page A-1.

Verifying Your Shipment

Before installing the XSR, first check your shipment to ensure that everything you ordered arrived safely. Open the shipping box(es) and verify that you received the following equipment:

- XSR chassis with installed hardware including any optional NIM cards (shipped separately)
- One country-specific power cable
- One external power supply and country-specific power cable (optional)
- One console cable
- Rack mount assembly
- Quick Start Guide

Installation Site Suggestions

When determining an installation site for the XSR chassis, follow the guidelines outlined below:

- For proper cooling, maintain a minimum clearance of 15.2 centimeters (6 inches) behind the chassis and 5.08 centimeters (2 inches) of clearance on either side of the chassis.
- If installing the XSR chassis as a free-standing unit on a shelf, ensure that the shelf can support a minimum weight of approximately 8 1/2 pounds per fully loaded chassis plus the weight of the connected network cables.
- For access to the rear of the chassis, allow an area of 48.26 centimeters (19 inches) wide by 61 centimeters (24 inches) deep.

- If installing the XSR chassis in an equipment rack, ensure that the rack can support and remain stable with the chassis installed.
- Each XSR AC power supply requires a three-pronged power receptacle capable of delivering the current and voltage specified in *Appendix A*. An AC outlet on a separately fused circuit is required for each XSR to provide power redundancy, and must be located within 182 centimeters (6 feet) from the site. The power cord used and type of outlet is dependent on the country. In the United States, a power cord with a NEMA 5-15P plug is provided with each XSR.
- Ambient temperature at the installation site must be maintained between 0° and 40°C (41° to 104°F). Temperature changes must be maintained within 10°C (18°F) per hour.

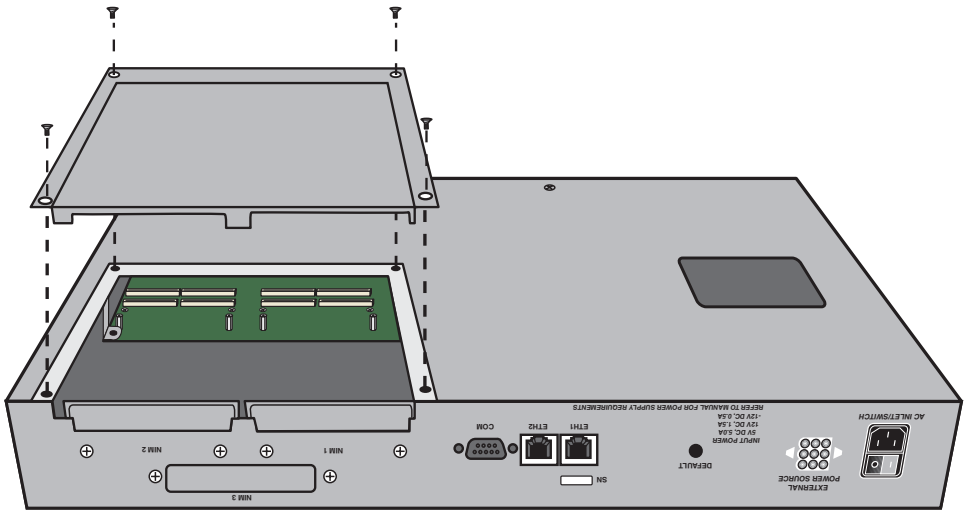
Installing NIM Cards and Rack Mounting

The XSR motherboard provides two NIM card slots with rear-panel access. Each NIM slot opens to a 64-pin connector on the motherboard.

Perform the following steps to install optional NIM card(s) and rack mount the XSR:

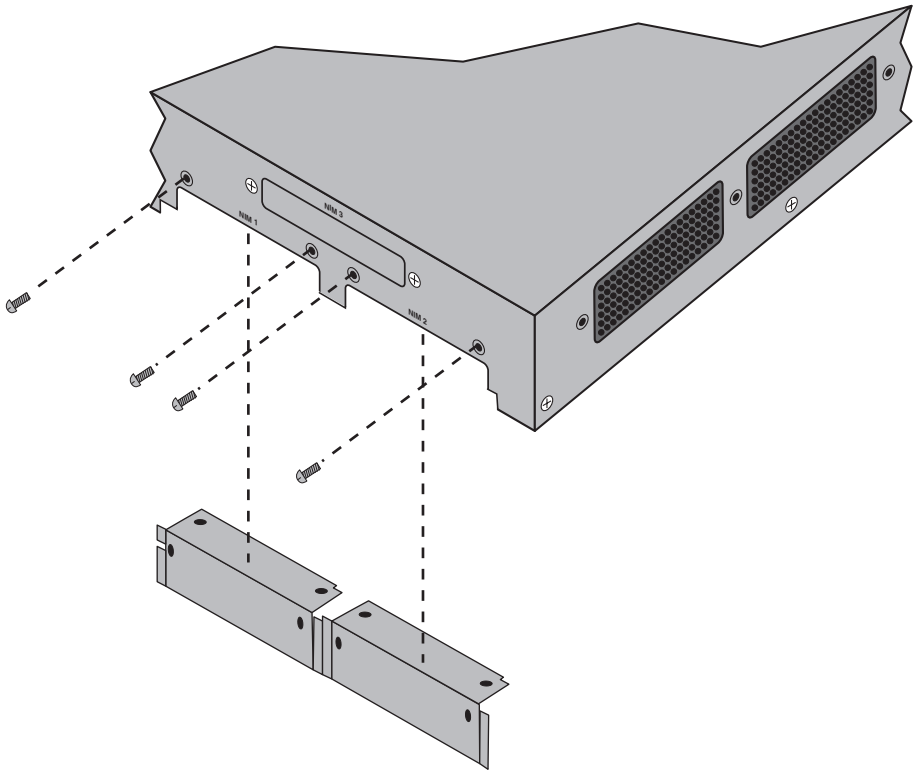
1. Be sure the power cord is disconnected before you add a NIM card.
2. Place the XSR top down on a flat, static-free surface.
3. Unfasten the four screws holding the bottom access cover to the chassis and remove it as shown in Figure 2-1.

Figure 2-1 Removing Rear Access Cover



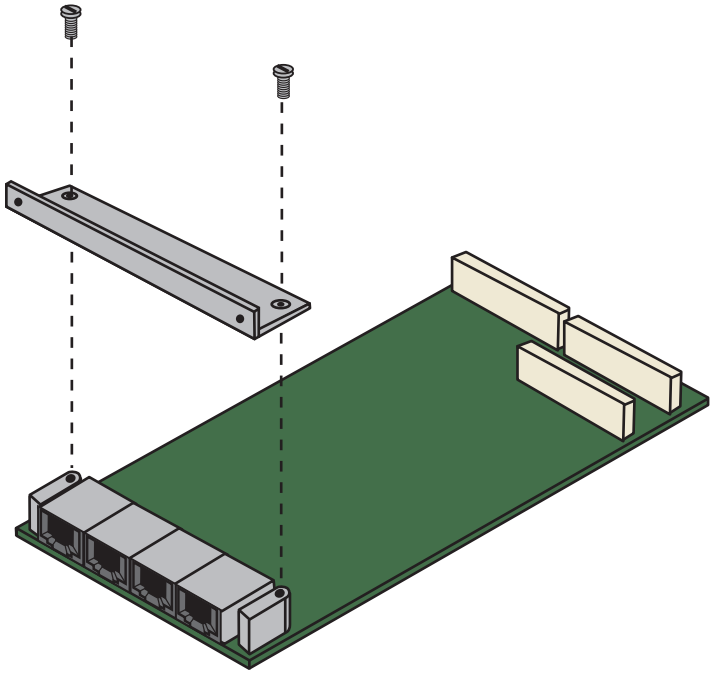
4. Unfasten the screws securing the NIM blank/grounding plates and remove them as shown in Figure 2-2.

Figure 2-2 Removing Blank/Grounding Plates



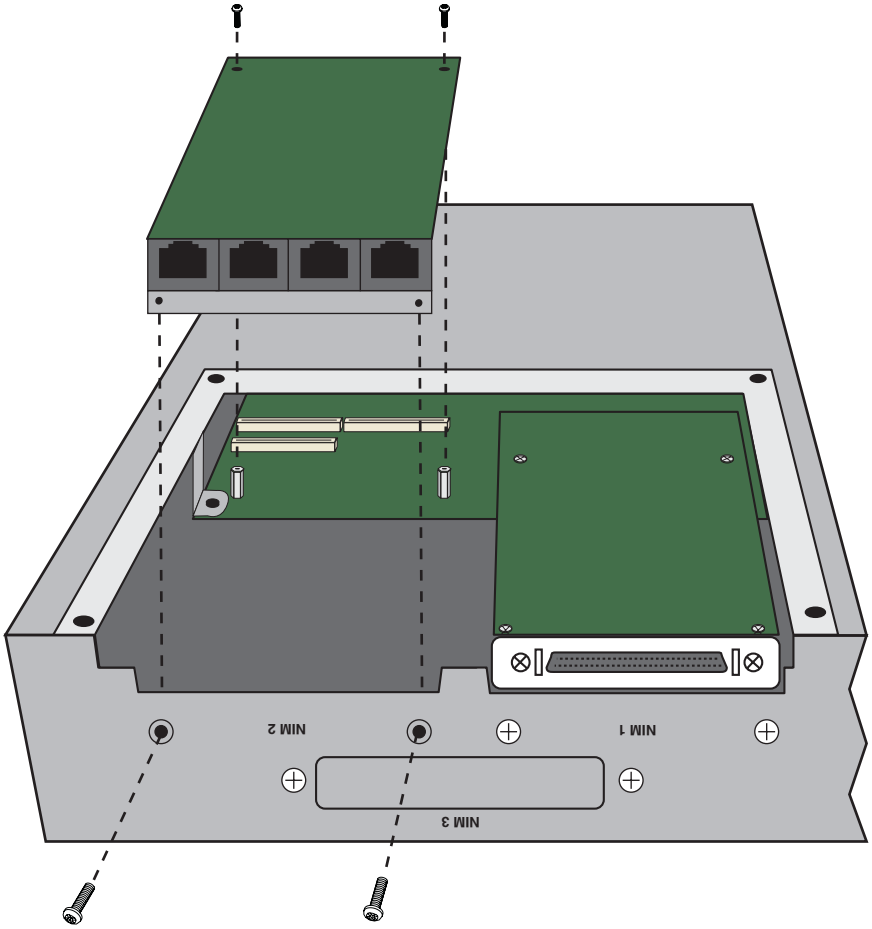
5. Fasten the NIM to the NIM brace and screws supplied in the shipping box, as shown in Figure 2-3.

Figure 2-3 Installing NIM Brace



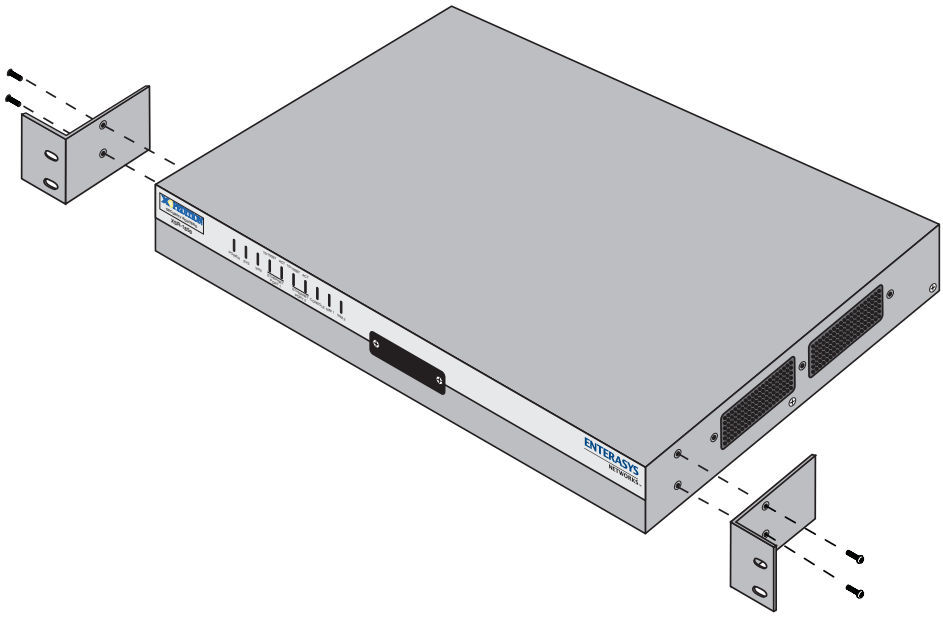
6. Position the NIM atop the open slot (NIM 2) pin holding assembly on the chassis and gently press into place. Fasten the back end of the NIM/brace to the chassis with the screws supplied, as shown in Figure 2-4.

Figure 2-4 Installing NIM Card



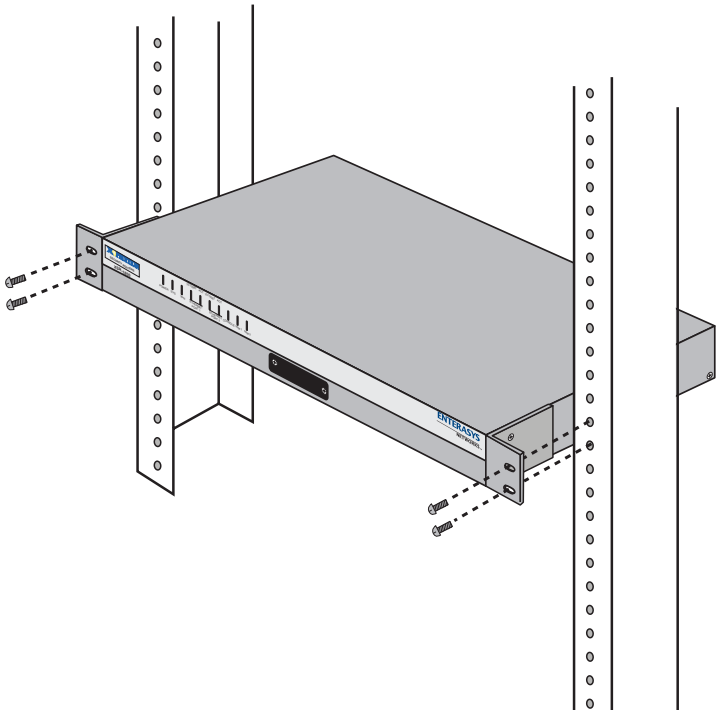
7. Reattach the bottom access cover to the chassis.
8. Attach the rack brackets to the chassis with the screws supplied, as shown in Figure 2-5.

Figure 2-5 Fastening Rack Brackets



9. Mount the bracketed XSR to your rack, as shown in Figure 2-6.

Figure 2-6 Attaching XSR to the Rack

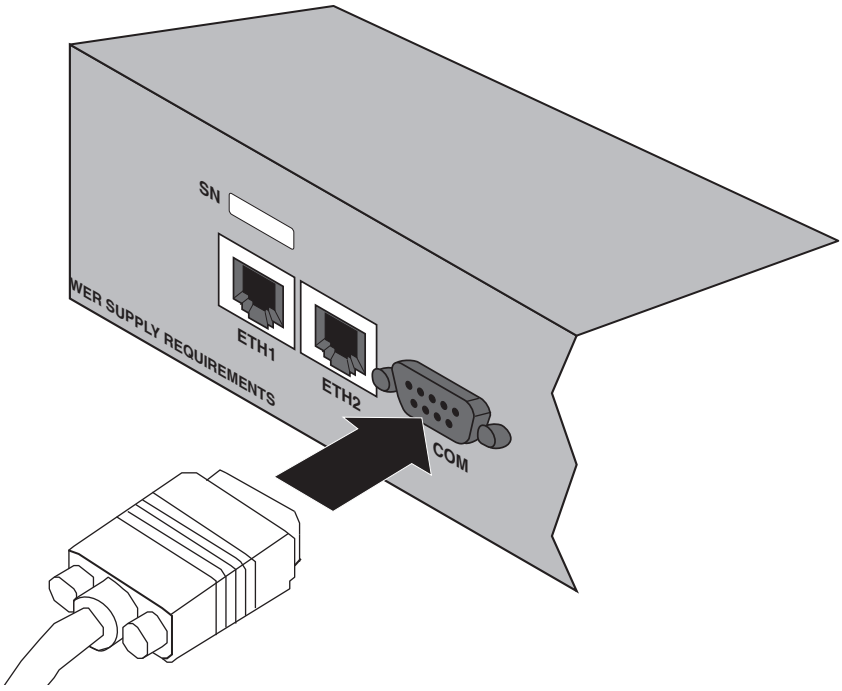


Connecting XSR Cables

Perform the following steps to connect your cabling:

1. Connect the serial Console cable provided in the packing box to your PC connector, as shown in Figure 2-7.

Figure 2-7 Connecting Serial Console Cable



2. Connect your WAN cables to the T1/PRI or BRI port(s) to your WAN connectors, as shown in Figure 2-8. Or, connect WAN cabling to your High Speed Serial connector, as shown in Figure 2-9.

Figure 2-8 Attaching T1/PRI or BRI Port Connector

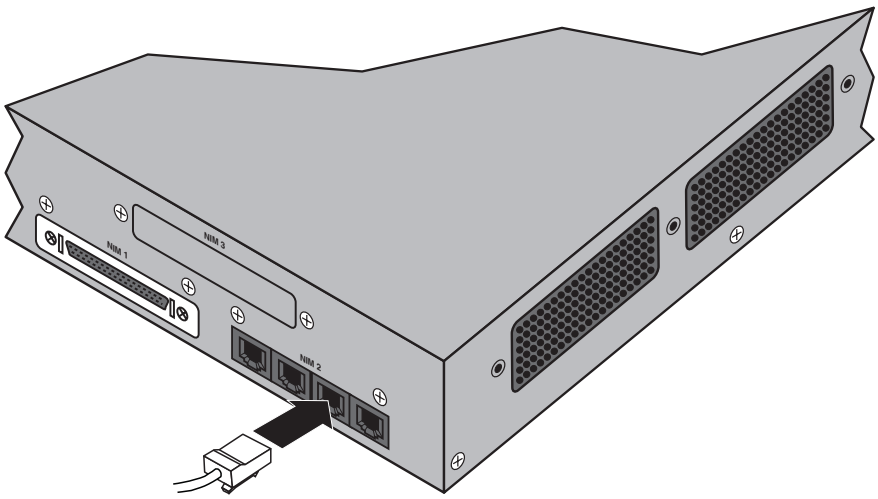
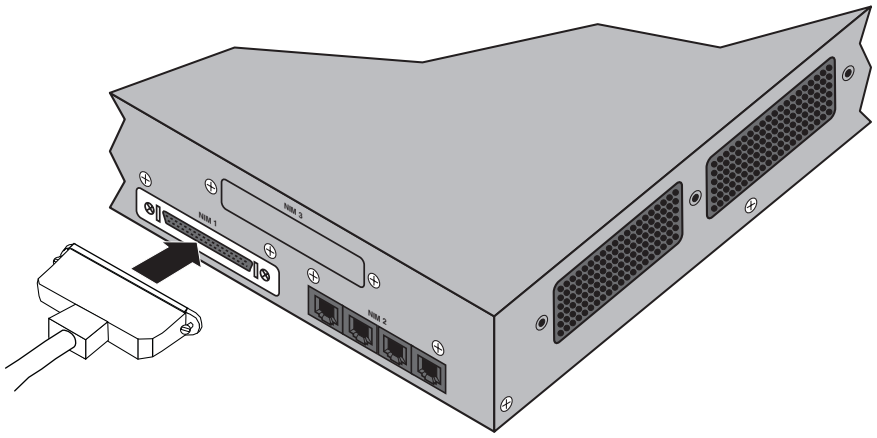


Figure 2-9 Connecting High Speed Serial Connector



3. Optionally, you can connect WAN cables to a T3/E3 NIM, as shown in Figure 2-10, or an ADSL NIM, as shown in Figure 2-11, or a T1 Drop & Insert NIM, as shown in Figure 2-12.

Figure 2-10 Attaching T3/E3 BNC Connectors

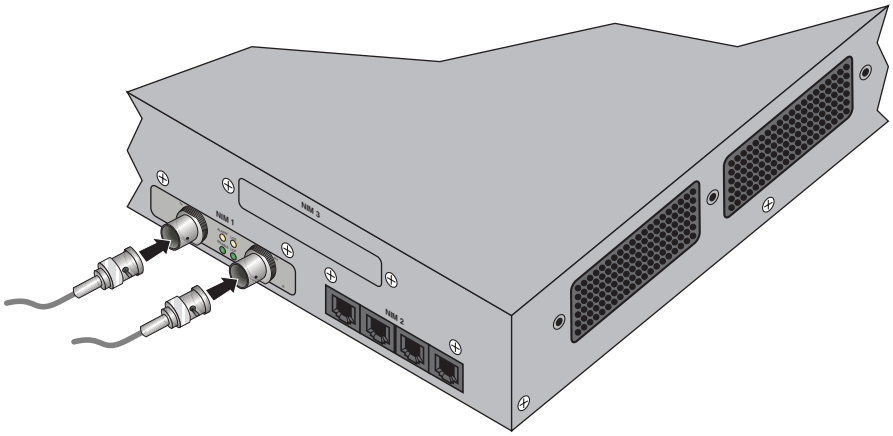


Figure 2-11 Connecting ADSL RJ-11 Connector

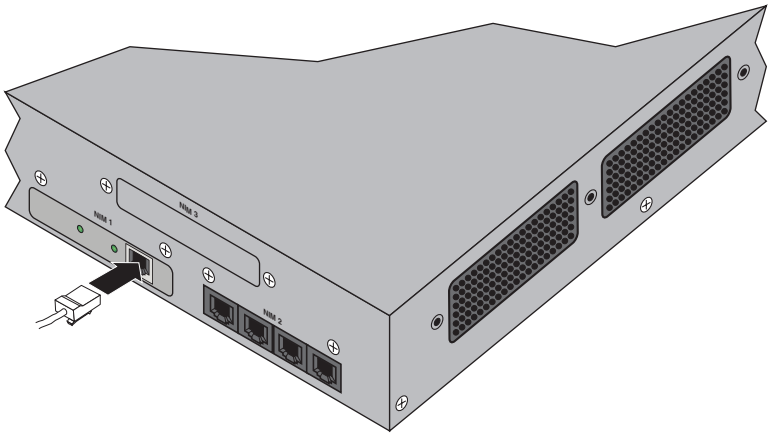
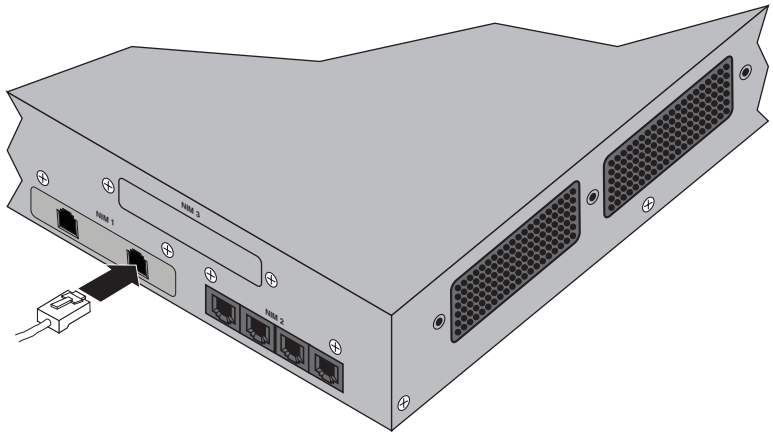
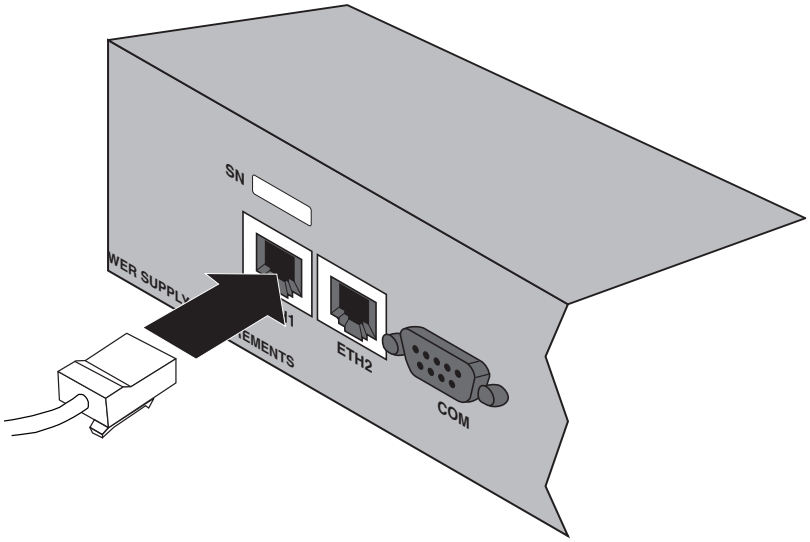


Figure 2-12 Connecting T1 Drop & Insert Connector



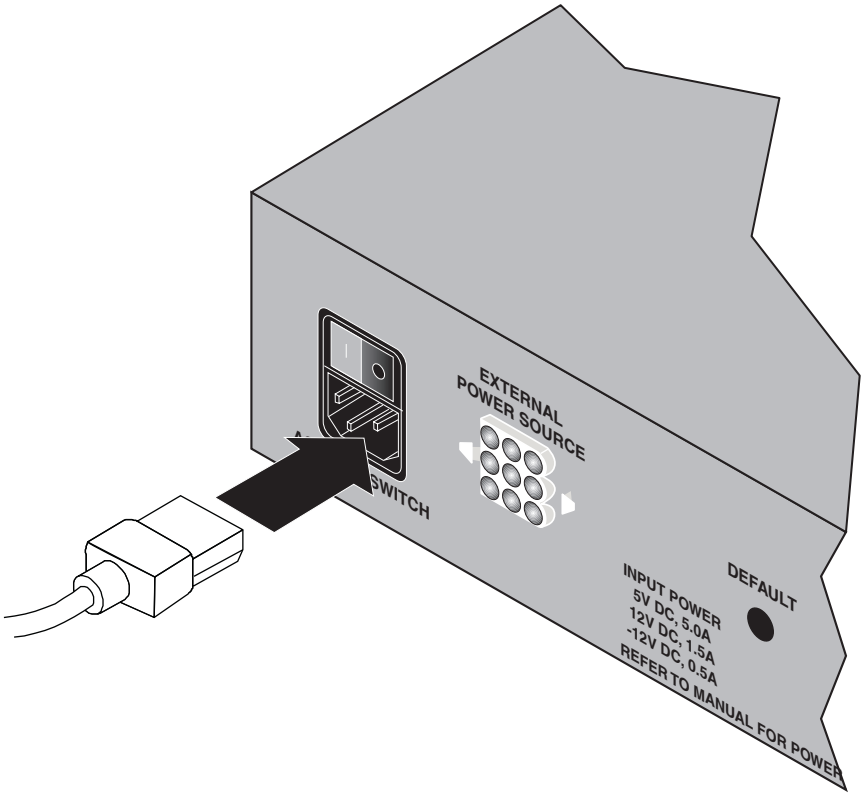
4. Connect the FastEthernet port(s) to your LAN connectors with a cable, as shown in Figure 2-13.

Figure 2-13 Attaching FastEthernet Connectors



5. Attach the power supply cord to the power connector at the rear of the router, as shown in Figure 2-14, and plug in the country-sprecific power cord to a wall socket. Optionally, you can attach the external power supply and cord to the external power source connector as a redundant power source.

Figure 2-14 Connecting Internal Power Supply Cord



You are now ready to configure the software and initialize the XSR. Continue with "Software Configuration" on page 3-1.

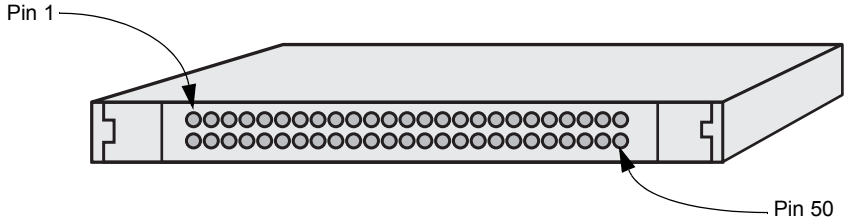
Installing a CompactFlash Memory Card

An optional CompactFlash (CF) memory card provides additional non-volatile storage capabilities in 8, 16, 32, or 64 Mbyte increments. The CF's controller interfaces with a host system allowing data to be written to and read from the CF's flash memory module. The XSR-1805 supports Type I and II CompactFlash card types. Refer to Figure 2-17 for a generic illustration of the card.

The CF's memory is large enough to store image files. You can do so simply by using the Bootrom Monitor mode **copy** command. For example, to copy a file from the Onboard *flash:* directory to the *cflash:* directory while in the *flash:* directory, enter:

```
XSR>copy <source_name> cflash:<destination_name>
```

Figure 2-15 Typical CompactFlash Card

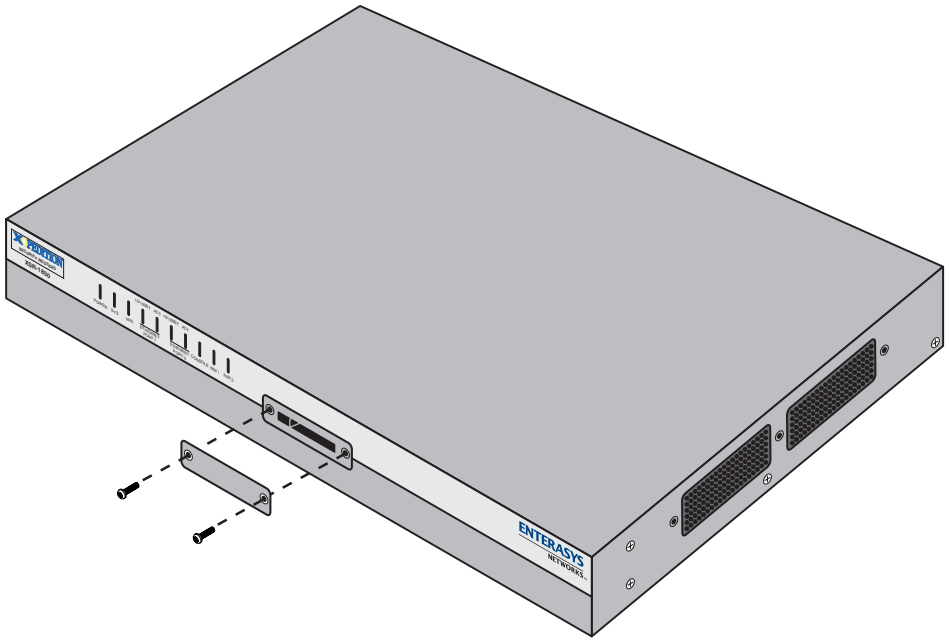


CompactFlash Card Installation

Follow the steps below to install the CompactFlash card:

1. If your CF is formatted, first remove the cover plate as shown in Figure 2-16. If it is not formatted, jump to "Formatting the CompactFlash Card" on page 2-12.

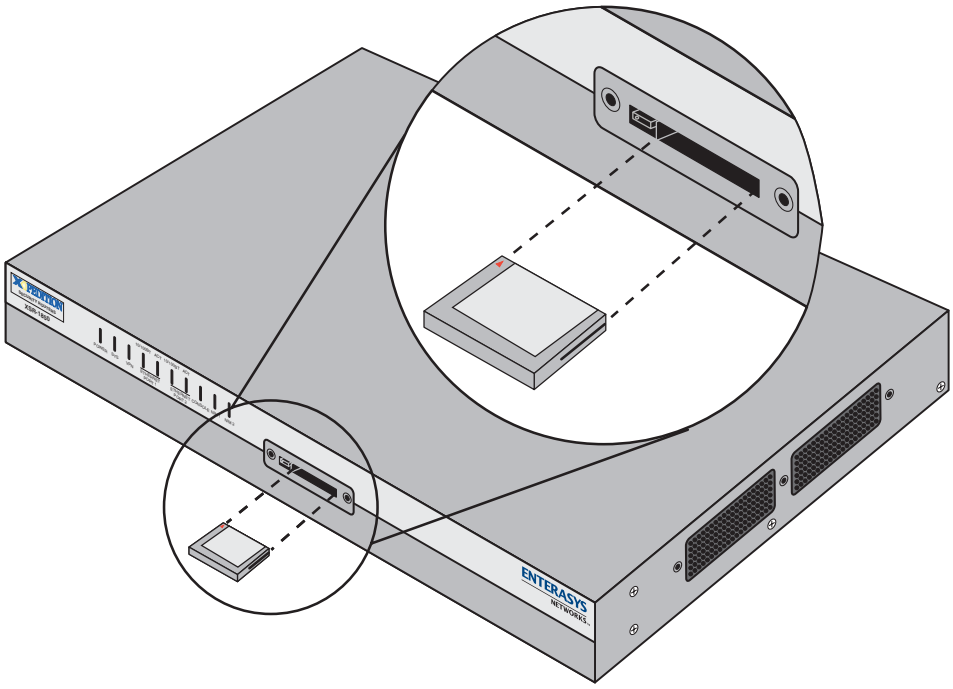
Figure 2-16 Removing CompactFlash Coverplate



2. Seat the card in the PCMCIA interface as shown in Figure 2-17.

Be sure the CF's wider grooved edge fits into the wider groove of the PCMCIA interface in the front of the XSR. Note that the XSR-1805's CF eject mechanism pops out when you install the card for easy removal.

Figure 2-17 Installing CompactFlash Card



Formatting the CompactFlash Card

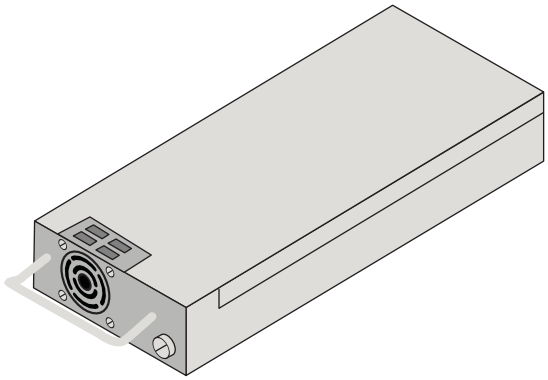
If your CF is *not* formatted, there are two ways you can format the card:

- Use the XSR Bootrom Monitor Mode **`ffc`** command. A few seconds after you boot up the XSR, press the CTRL-C keys and a password prompt will appear. Press ENTER (factory default) if you have not defined any password. The Bootrom Monitor Mode will appear. Enter **`ffc`** and the router will complete the formatting.
- Install the CF in a PCMCIA card and enter the Windows format command. For further instructions, refer to Windows documentation.
- After completing CF formating via Bootrom Monitor Mode, use the **`bc`** command to restart the XSR in normal mode.

Installing the Redundant Power System

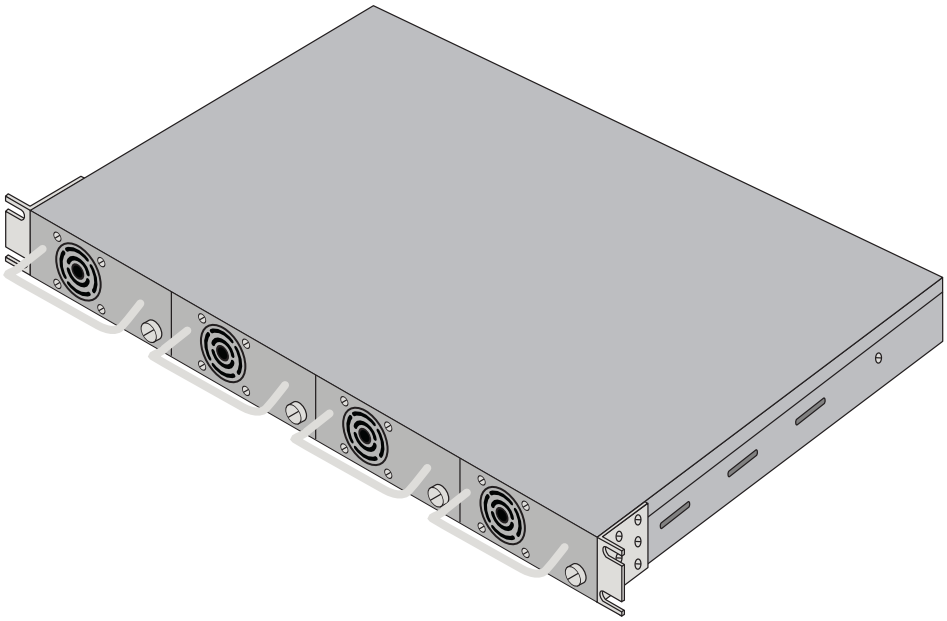
The XSR-1850 provides an optional, external power supply, as illustrated in Figure 2-18, for use as a supplemental power source. This 50-watt, AC to DC Redundant Power System is a truly redundant unit which is operated in parallel with the standard internal power supply, with which it shares power buses. The power system requires no configuration - it begins operating when all cables are connected.

Figure 2-18 Redundant Power System



Up to four power systems can be installed in the 1U Passive Power Chassis, as shown in Figure 2-19, which can be rack mounted. Two-foot long DC power harnesses are provided to attach XSRs and the chassis, as well as a standard, 2-meter shielded power cord for the chassis-to-wall outlet connection. Power systems are hot swappable and are equipped with a built-in fan which extends the units' lifespans but are not essential for normal functionality.

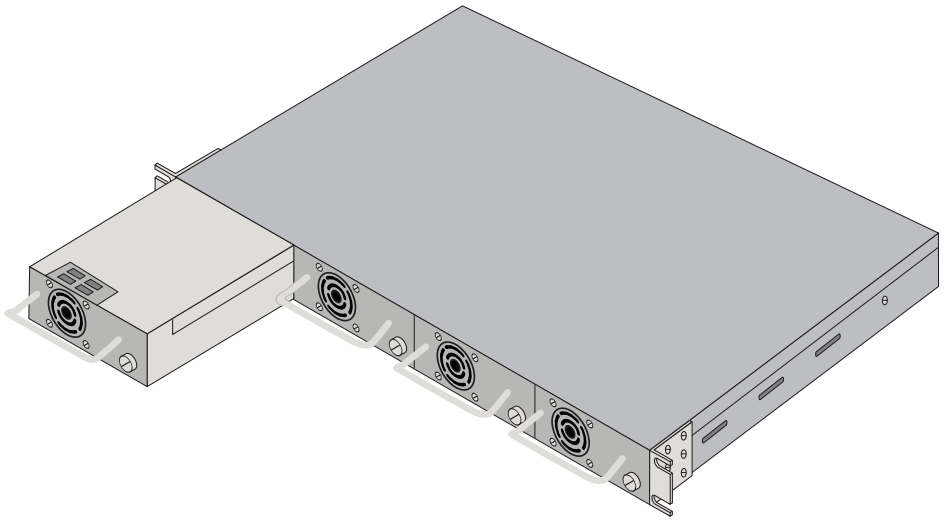
Figure 2-19 Passive Power Chassis (Fully Loaded)



To install the Redundant Power System in the Passive Power Chassis, perform the following steps:

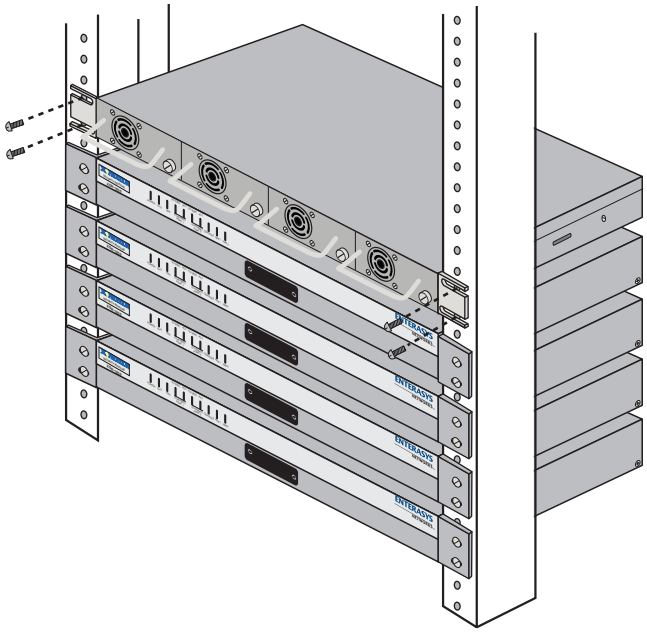
1. On a clean, static-free surface, insert the power system in the power chassis as shown in Figure 2-20.

Figure 2-20 Inserting Power System in Passive Power Chassis



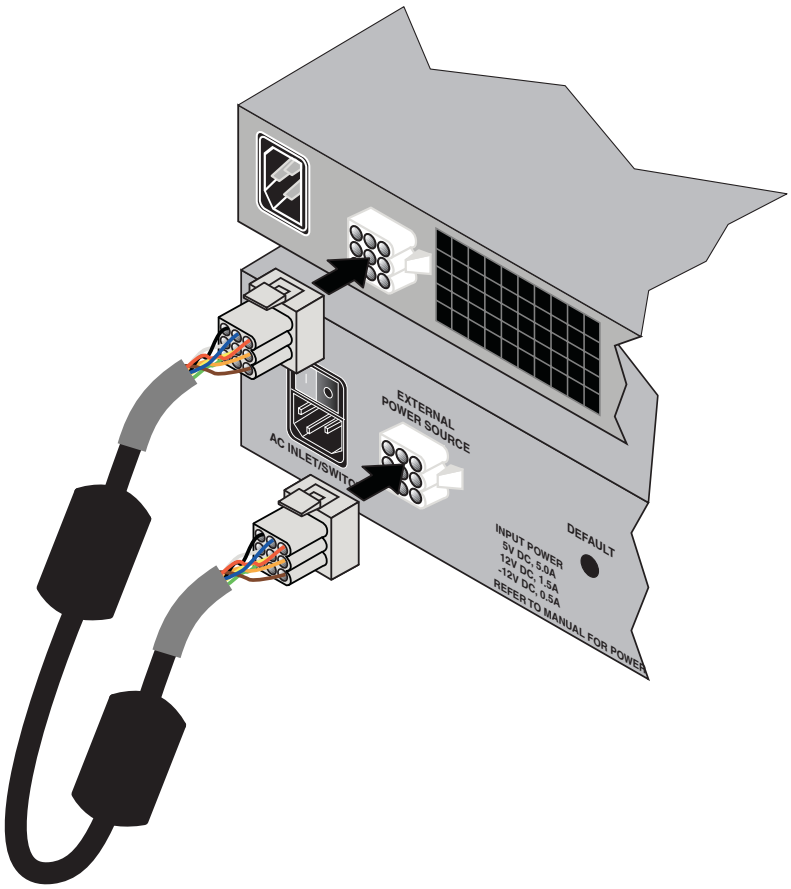
2. Mount the power chassis in a standard 19″ rack, as shown in Figure 2-21.

Figure 2-21 Rack Mounting the Power Chassis



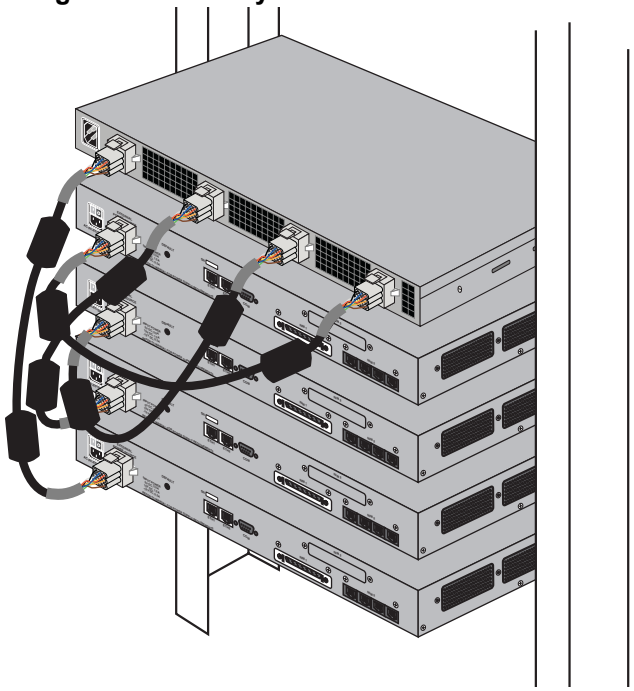
3. Insert one end of the DC cable harness into the power chassis connector, and the other end into the XSR external connector, as shown in Figure 2-22.

Figure 2-22 Connecting DC Cable Harness



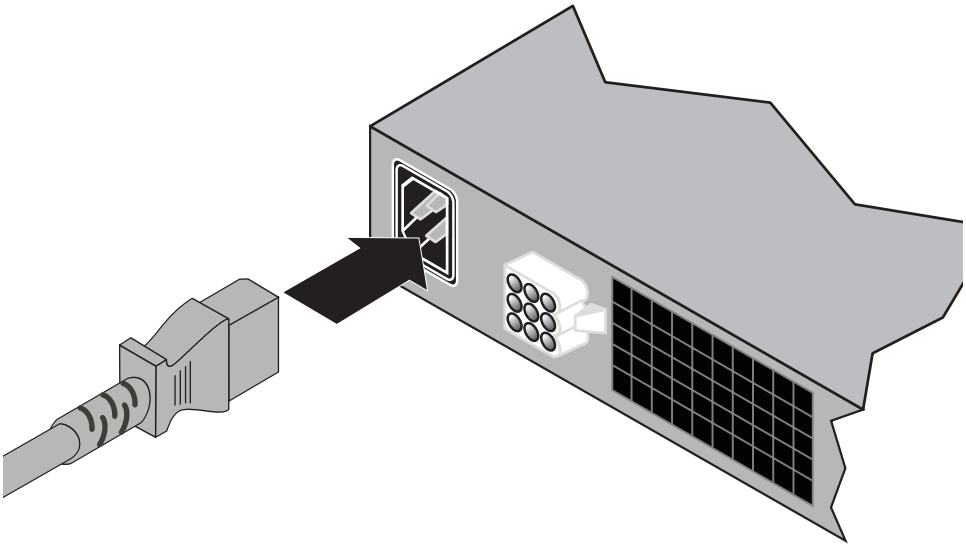
4. When connecting cable harnesses, be careful to attach them with a minimum of stretching, as shown in Figure 2-23.

Figure 2-23 Fully Attached Cable Harnesses



5. Connect one end of the power cord into the power chassis, as shown in Figure 2-24, and the other end into a wall outlet. Appropriate international power cords are provided by Enterasys.

Figure 2-24 Connecting Passive Chassis Power Cord



3

Software Configuration

This chapter describes how to initialize, quickly set up and verify your configuration for the XSR. Refer to the *XSR CLI Reference Guide* for a more thorough explanation of commands and parameter options. Also included are sample configuration scripts, detailed XSR rebooting characteristics, and Remote Auto Install (RAI) and Bootrom Monitor mode instructions.

Software configuration comprises the following procedures:

- Power on the XSR and initialize the software
- Open a console session to the XSR
- Name the XSR and add users/passwords
- Set up LAN ports
- Configure WAN ports for dialer and backup dialer service
- Configure the Firewall feature set
- Configure IP routing: RIP or OSPF
- Configure Frame Relay networks
- Set up a backup line
- Create an SNMP community string and traps
- Configure message logging and severity level
- View your configuration
- Connect via SSH, Telent or the Web
- LAN/PPP Services Sample Configuration
- Frame Relay WAN Link and PPP Backup Sample Configuration
- VPN configurations (see the *XSR User's Guide* for a Client example)

Powering On and Initializing XSR Software

1. Be sure the NIM cards are installed and cable connections are snug.
2. Turn the power switch on the rear panel in the ON position.

   The LED sequence is as follows:

   - Power LED turns ON.
   - All LEDS flash quickly on and off starting from the SYS LED on the left, proceeding to the right.

- ETH 10/100 LEDs turn ON and OFF a few times during initialization as the XSR proceeds from bootrom to power up diagnostics to software image, then they remain ON or OFF depending on the LAN type.
- ETHERNET Activity LEDs blink when frames pass on the LAN.
- Console Activity LED is OFF until the CLI comes up. Then it blinks ON/OFF during console keyboard input or output.
- NIM LEDs are OFF until the CLI comes up. Then they are turned ON if a supported card is present (T1/E1 or Serial), *and* the card passes the power-up diagnostics test.

3. XSR software initializes in two phases. A cold start (including power cycling) is marked by diagnostic and router software phases. A warm start skips the powerup diagnostics and boots to router software. First-time startup is a cold start with the following sequence of events:
   - Basic hardware initialization of the processor, memory, and other components occurs.
   - Bootrom Monitor mode is accessible now and can be entered by pressing a special key combination within a 5-second interval. For more information, refer to "Bootrom Monitor Mode Commands" on page 3-36.
   - Power-up diagnostics test the following hardware blocks:
     - RAM size is detected
     - On-board Flash size is detected
     - FastEthernet is checked
     - Ethernet on motherboard is checked
     - NIM cards 1 and 2 is checked
     - Real-Time Clock are checked
     - Front panel LEDs are set to reflect current status
   - Diagnostics test results are saved for later use by system software.
   - The software image in Flash memory is verified by checksum.
     - If no valid image exists in **`flash:`** or **`cflash:`**, Bootrom Monitor mode is acquired.
     - If the default file (*xsr1800.fls*) is not found as specified in Bootrom mode, an FTP/TFTP server as defined in network parameters of Bootrom mode is queried.
     - If the image is not found remotely, initialization is suspended in Bootrom mode.

Note: Optionally, you can create a *boot-config* file to identify the name of a firmware file from which the XSR boots. Refer to the **boot system** command in the *XSR CLI Reference Guide* for more information.

   - A valid image in Flash memory, if present, is decompressed.
   - The decompressed software image is loaded into RAM.
   - Execution is passed to the software image.
   - The operating system is started.
   - The Flash startup configuration files (*startup-config*, *private-config*) become the running configuration.
   - All software modules are initialized. If an error occurs when processing *startup-config*, the CLI will continue processing the file until the end. If the file contains more than one error,

only the first error will be reported, along with a count of the sum of errors incurred. In the case of a single error, only the error line will be reported. Error messages will be logged as well. Because the result of continuing to process a flawed *startup-config* is not predictable, the nature and position of the syntax error may cause erroneous configuration of the XSR.

- Router ports and protocol stacks are initialized based on startup configuration.
- Alarms and messages reported during initialization are logged.
- The Console is up.
- The XSR is up.

To view the screen output produced when the XSR reboots, refer to "XSR Rebooting Characteristics" on page 3-33.

Opening a Console Session

1. Open a Console session to the XSR using Microsoft's HyperTerminal, Procomm or other program.

   Set the session properties as follows: BPS - 9600, Data bits - 8, Parity - none, Stop bits - 1, Flow control - none. Refer to "Initialization Output" on page 3-33 to view XSR initialization data.

2. When the XSR login appears, enter **admin** and enter no (blank) password. Note that logins and passwords can be changed later.
3. Optionally, you can use the Console port as a serial interface in a dial backup capacity. Refer to "Setting Up the Backup Line" on page 3-16.
4. Another option is to run from a factory default node the Remote Auto Install (RAI) program which permits you to automatically retrieve a centrally managed configuration specifically created for the node's operation in your network.

Note: You can abort RAI at any time by pressing any key.

Refer to the following section for quick configuration of RAI. For a full description of RAI including how it works, see Chapter 2: "Managing the XSR" in the *XSR User's Guide*.

Optional: Configuring Remote Auto Install

In short, the RAI application transports a startup configuration file from a TFTP server for use in configuring the remote XSR. This file is placed in the **`Flash:`** directory as the **`startup-config`** and executed via the normal startup process. RAI is supported on a Frame Relay network running on a serial NIM card (configuration example shown below), RAI over Ethernet (with DHCP), RAI PPP over a Leased line or RAI over an ADSL network.

For remote XSR setup, you need only hook up cabling as described in *"Chapter 2: Hardware Installation"* of this guide.

Configuring RAI for Frame Relay

To configure two remote XSRs with RAI over Frame Relay, perform the following setup on the central site. On multi-point Serial sub-interface 1/0.1, configure DLCIs 16 and 18 to *statically* map

to IP addresses 133.133.1.2 and 133.133.1.3. If the DLCI will onnect to a remote XSR running RAI, then add the *bootp* parameter after the static IP address.

This configuration supports two remote XSRs connected on DLCIs 16 and 18. Make sure with your Frame Relay provider that these DLCIs terminate at the location of the remote XSRs. To add more remote XSRs, you will need additional DLCIs.

Note the use of a *helper-address* to specify a destination address for UDP broadcasts and forward traffic to the DNS and TFTP servers. In the example below, DNS and TFTP servers reside on the same node - 10.10.1.2 (configuration of DNS and TFTP servers are not shown here). In short, the DNS server should map IP addresses 133.133.1.2 and 133.133.1.3 to hostnames. On the TFTP server, you should create a startup-config file with names <hostname>-config in a directory accessible by TFTP.

```
XSR(config)#interface serial 1/0.1 multi-point
XSR(config-if<S1/0.1>)#ip helper-address 10.10.1.2
XSR(config-if<S1/0.1>)#ip address 133.133.1.1
XSR(config-if<S1/0.1>)#frame-relay interface-dlci 16 ip 133.133.1.2 bootp
XSR(config-if<S1/0.1>)#frame-relay interface-dlci 18 ip 133.133.1.3 bootp
XSR(config-if<S1/0.1>)#no shutdown
XSR(config-if<S1/0.1>)#exit
XSR(config)exit
XSR#copy running-config startup-config
```

RAI displays the following phased output on the remote node. Refer to the accompanying notes for additional explanation of phases.

```
********************* REMOTE AUTO INSTALL STARTING ***************
```

+ *RAI is starting up.*

```
************* REMOTE AUTO INSTALL ATTEMPTING FOREVER **************
```

+ *Persistent (or Non-Persistent) RAI is attempted.*

```
Phase 0 - Initialization and Starting search for proper media-type
Phase 0 - Trying media-type V35
******** PRESS ANY KEY TO TERMINATE REMOTE AUTO INSTALL ***********
```

+ *A periodic reminder that you can terminate the program at any time by depressing any key on your keyboard. Be aware that any existing startup-config that may exist in the node will be executed.*

```
Phase 1 - Trying media-type RS232
```

+ *Upon failing, the next media-type is tried.*

```
Phase 1 - Frame Relay interface Serial 1/0 reported DLCI 16 active
```

+ *Frame Relay has successfully found a FR network with active DLCIs.*

```
Phase 2 - transmitting bootp - attempt #1
```

+ *The bootp client is sending out a request. At most, five requests will be tried.*

```
Phase 3 - received IP address: 133.133.1.2
```

+ *The bootp client has received a response and the IP address for this interface is 133.133.1.2.*

```
Phase 4 - Sending out Reverse DNS query onto Frame Relay
```

+ *rDNS is sending out a query looking for the hostname for IP address 133.133.1.2*

Phase 6 - getting hostname xsrnode-confg from tftp server into flash: startup-config

+ *rDNS has responded with the hostname* **xsrnode** *which will be used in the TFTP transfer. RAI will try several file names if this file is not available from the server.*

Phase 7 - preparing node to execute startup-config

+ *TFTP transfer succeeded in copying the hostname file to the* **Flash: startup-config** *file.*

******************* REMOTE AUTO INSTALL TERMINATING******************

+ *The RAI process is complete and is preoceding to system initialization where it will process the new* **startup-config** *file.*

Configuring RAI for DHCP over LAN

The following example configures DHCP server to be used with RAI over Ethernet. Note that there is no need for a DNS server because the **startup-config** name is provided by the DHCP server. Begin by creating an IP local pool which will include the Fast/GigabitEthernet interface address:

```
XSR(config)#ip local pool dhcp 200.1.0.0 255.255.255.01
```

Next, configure the interface that will service the remote device, set the IP address inside the pool defined earlier, and enable DHCP Server:

```
XSR(config)#interface GigabitEthernet 2
XSR(config-if<G2>)#ip address 200.1.0.4 255.255.255.0
XSR(config-if<G2>)#ip dhcp server
XSR(config-if<G2>)#no shutdown
```

Now configure the following DHCP Client parameters:

```
XSR(config)#ip dhcp pool dhcp
XSR(config-dhcp-pool)#lease 0 0 10
```

+ *This command sets a lease interval of 10 minutes*

```
XSR(config-dhcp-pool)#hardware-address 0001.f412.2334
```

+ *This command sets the MAC address of the client*

```
XSR(config-dhcp-pool)#host 200.1.0.66 255.255.255.0
```

+ *This command binds 200.1.0.66/24 to the earlier configured hardware address*

```
XSR(config-dhcp-pool)#option 12 instance 0 ascii etr1
```

+ *This command sets the Client hostname as* ***etr1***

```
XSR(config-dhcp-pool)#option 150 instance 0 ip 1.1.1.1
```

+ *This command configures the TFTP server IP address to 1.1.1.1*

```
XSR(config-dhcp-pool)#option 67 instance 0 ascii etr1-startup-confg
```

+ *This command enters the config-file name as startup-config*

Remember to save your configuration after all edits.

Configuring RAI over ADSL

In the following example, a remote XSR is connected to an ADSL network at the central site with a PPPoE server. A TFTP server runs on a separate machine - 192.168.72.118, while the PPPoE server runs on a CISCO router. The PPPoE server can reside on any other device providing PPPoE session termination and has a mechanism to direct TFTP broadcast packets to a specific IP address. A DNS server is not required with this method because RAI over ADSL uses the serial number of the XSR for the **startup-config** name.

The following is a CISCO configuration at the the central site:

```
vpdn enable
```
+ Enables a virtual private dial-up network configuration on the router.

```
vpdn-group 1
```
+ Creates a VPDN session group and links it to a virtual template.

```
accept-dialin
protocol pppoe
virtual-template 1
pppoe limit per-mac 10
```
+ This is an optional command.

```
pppoe limit max-sessions 32000
```
+ This is an optional command.

```
interface GigabitEthernet1/0/0
no ip address
negotiation auto
!
interface GigabitEthernet1/0/0.10
encapsulation dot1Q 20
pppoe enable
pppoe max-sessions 10
```
+ Optional. This command enables PPPoE and allows PPPoE sessions to be created through this sub-interface.

```
!
interface Virtual-Template1
ip unnumbered loop 0
mtu 1492
peer default ip address pool pool1
ppp authentication pap
ip helper-address 192.168.72.118
```
+ This is the address of the TFTP server.

```
ip directed-broadcast
```
+ This command configures the virtual template interface.

```
!
ip local pool pool1 192.168.0.1 192.168.0.100
username 0000019876543210 password 0 0000019876543210
```
+ Enter the remote XSR's serial number.

```
aaa new-model
!
aaa authentication ppp default local ! look at local database first
aaa authentication ppp dialins local
```
+ Specifies the IP local pool to use for address assignment.

When the RAI process begins, the remote XSR displays the following messages:

```
**************** PRESS ANY KEY TO TERMINATE REMOTE AUTO INSTALL ***************
Phase 2 - ADSL - searching for pvc's ...Training (60 sec)
```
+ The XSR begins training with the DSLAM, waiting 60 seconds.

```
Phase 2 - ADSL - searching for pvc's ...Training (54 sec)
Phase 2 - ADSL - searching for pvc's ...
```
+ Training is successful, discovery of VPI/VPCs begins.

Phase 2 - ADSL - searching for pvc's ...vpi/vci (0/0)

+ The XSR looks for PVC 0/0 and higher.

Phase 2 - ADSL - searching for pvc's ...vpi/vci (0/38)

+ The XSR looks for PVC 0/38 and higher.

Phase 3 - ADSL - trying to connect on 0/35 with snap PPPoE

+ PVC 0/35 is found, SNAP PPPoE encapsulation is applied and authentication tried if required.

Phase 3 - ADSL - waiting for IP to connect (54 sec)

+ The XSR waits one minute for the PPPoE connection to come up.

Phase 4 - ADSL - IP is connected on 0/35, prepare to load startup config

+ The XSR starts downloading the startup-file.

Phase 6 - ATM/ADSL - retrieving file 0000019876543210-confg from tftp server 25 5.255.255.255

+ The startup-config name is the serial number of the XSR.

Phase 7 - preparing node to execute startup-config

Configuring the XSR Name and User Information

1. At the CLI prompt, enter **enable** to acquire Privileged EXEC mode.
2. Enter **configure** to acquire Global mode.
3. Enter **hostname** <*your XSR designation*>.
4. Enter **username** <*name*> <**privilege** *level*> **password** <*cleartext | secret*> <*0 | 5*> <*password*>.
5. Enter **banner login** <*your welcome text*> to add a user login banner.

   Remember to save your configuration after all edits.

Setting User Name, Privilege and Password

The value <*name*> is the user's designation - for sake of clarity, often set as the name of the facility or site the XSR connects to. The value <*privilege level*> (0-15) prioritizes this user in terms of configuration rights with 15 as the highest and 0 the lowest (default). When you create a new user you can decide which privilege that user will have (if you are *admin*). For example, a user with privilege 7 will be allowed to execute only commands with privilege levels between 0 and 7.

Default privilege levels are defined for all commands and the *admin* user and are listed in the *XSR CLI Reference Guide* under the **privilege** command. You can change a command's default privilege by entering: **privilege <configuration_mode> level <0-15> <command | command_group>**.

The value <*cleartext | secret*> can be sent in the clear or encrypted with a **0** (the input password is not expected to be unencrypted so the XSR will encrypt it) or **5** (the input password is expected to already be encrypted so it will not be encrypted again). The value <*pass*> is the password associated with the specified name. The MD5 algorithm is encrypts the password.

Note: Newly created users are stored in the *startup config* file. You can also delete admin but only if you first create another level 15 user.

Setting the Clock

XSR 1800 and 3000 Series routers have an on-board Real Time Clock (RTC) chip with which to keep accurate time across the network. As an alternative to accessing a public time server, you can utilize the RTC as a time reference and propagate it by configuring XSRs as Simple Network Time Protocol (SNTP) servers or clients. XSR 1200 Series routers do not carry an RTC chip, however, and if your topology includes these devices you ***must*** synchronize them from an external source.

Enter the following command to configure the XSR as an SNTP client:

```
XSR(config)#sntp-client server [primary | A.B.C.D.][alternate | A.B.C.D.]
```

Enter the following command to configure the XSR as an SNTP server:

```
XSR(config)#sntp-server enable
```

Remember to save your configuration after all edits.

Configuring the LAN Ports

1. Enter **interface fastethernet** <*1* | *2*> to acquire Interface mode and select the first or second FastEthernet port.

   The first FastEthernet port is located next to the power switch.

2. Enter **ip address** <*xxx.xxx.xxx.xxx*> <*yyy.yyy.yyy.yyy*> where *x* is the IP address and *y* is the subnet mask of this FastEthernet port.

3. Enter **no shutdown** to keep the interface enabled.

4. Enter **show ip interface fastethernet** <*1* | *2*> to verify LAN settings.

   Remember to save your configuration after all edits.

Configuring the WAN Ports

For ISDN PRI configuration, continue below; or see "BRI Configuration" on page 3-9, or "ADSL Configuration" on page 3-11.

PRI Configuration

1. Enter **controller** <*t1* | *e1*> <*slot* # | *card* # | *port* #> of the first installed T1/E1/ISDN-PRI NIM to acquire Controller mode and set up the physical port.

2. Enter **no shutdown** to keep the interface enabled.

   The above commands add either one channel-group *0* having 24 timeslots for the *T1* controller with default values for framing set to *ESF*, *B8ZS* line encoding, and *line* clock source, *or* one channel-group *0* having 31 timeslots for the *E1* controller including *crc4* framing, *hdb3* line encoding, and *line* clock source defaults. For a *non-default* configuration, go to Step 3.

3. Enter **clock source** <*line* | *internal* | *internal synchronization*> to select where the XSR will derive its timer for synchronized data transmission.

   The line source derives from the network, internal derives from a chip on the XSR, and internal synchronization derives from the first T1/E1/ISDN-PRI card by clock transfer.

4. Enter **no channel-group** <*number*> to delete the default group.

5. Enter **channel-group** <*number*> **timeslot** <*number*> <*speed*> <*number*> to create a channel group.

This command allows multiple logical WAN interfaces to be created on a single channelized T1/E1/ISDN-PRI port, ranging from *0 - 23* for T1 lines, and *0 - 31* for E1 lines. Also, from *1 - 24* T1 and *1 - 31* E1 *timeslots* can be set. Channel speed options are 56 (T1) or 64 (E1) kbps.

Note: Channel group and timeslot number ranges are *different*. Be sure to match them correctly and within the range. Also, when adding a *second* T1 or E1, be sure to begin channel numbering again at *0*.

6. Enter **framing** <*sf* | *esf* | *crc4* | *no-crc4*> to set the framing type.

   The value you set must match the type and format offered by your service provider and must correlate with the NIM card you are configuring: *sf* or *esf* for T1 cards, and *crc4* or *no-crc4* for E1 cards.

7. Enter **linecode** <*ami* | *b8zs* | *hdb3*> to configure the encoding type.

   This setting must match your service provider's linecode type and type of NIM card installed: *B8ZS* for T1 only, *HDB3* for E1 only, and *AMI* for both T1/E1.

8. Enter **interface serial** <*slot #* | *card #* | *port #*> of the serial NIM card to acquire Interface mode and configure the logical interface.

9. Enter **encapsulation ppp** to set the encapsulation type.

10. Enter **ppp authentication** <*chap* [*ms-chap*] [*pap*] | *pap* [*ms-cha*p] [*chap*] | *ms-chap* [*chap*] [*pap*]> for the authentication type on the port.

11. Enter **ip address** <*xxx.xxx.xxx.xxx*> <*yyy.yyy.yyy.yyy*> where *x* is the IP address and *y* is the subnet mask of the serial port.

12. Enter **backup interface dialer** <*number*> to allow the serial interface to set the specified dialer interface as a dialed backup.

13. Enter **no shutdown** to keep the interface enabled.

14. Enter **show controller** <*T1* | *E1*> <*slot/card/port*> to verify NIM settings.

15. Enter **show interface serial** <*slot#* | *card#: channel#*> to verify serial port settings.

16. Enter **show ppp interface serial** <*card#*|*port#:channel#*> to display PPP status on the interface.

17. Enter **show dialer** to verify your dialer interface configuration.

    Remember to save your configuration after all edits.

BRI Configuration

ISDN BRI can be configured on a leased (over PPP or Frame Relay) or non-leased, switched line. Continue configuration with the BRI type of your choice.

BRI Leased Line

1. Enter interface **`bri 0:<1 | 2>`** to acquire Interface mode and select the BRI port and channel 1 or 2.

2. Enter **`leased-line <64 | 128>`** to acquired BRI interface mode and select 64 or 128 kbps line speed. Selecting 128 assigns B1 and B2 timeslots to channel 1 while 64 assigns either B1 or B2 timeslots to channel 1 or 2.

3. Enter **`ip address <xxx.xxx.xxx.xxx>/24`** to set an IP address for the BRI interface.

4. Enter **encapsulation ppp** to select PPP encoding.
5. Enter **no shutdown** to keep the BRI interface enabled.

BRI Leased Frame Relay

1. Enter **interface bri 0:<1 | 2>.<1-30>** to acquire BRI Interface mode and select the BRI port and channel 1 or 2.
2. Enter **encapsulation frame-relay** to select Frame Relay encoding.
3. Enter **no shutdown** to keep the BRI interface enabled.
4. Enter **frame-relay lmi-type <ilmi | ansi | q933a | auto | none>** to select the Local Management Interface type.
5. Enter interface **bri 0:<1 | 2>.<1-30> multi-point** to acquire BRI Sub-interface mode and select the BRI port, channel, and sub-interface.
6. Enter **ip address <xxx.xxx.xxx.xxx>/24** to set an IP address for the BRI interface.
7. Enter **frame-relay interface-dlci <16-1007>** to acquire Frame Relay DLCI Interface mode and assign a data-link connection identifier to the Frame Relay sub-interface.
8. Enter **no shutdown** to keep the BRI sub-interface enabled.

BRI Switched Line

1. Enter **interface bri 0** to acquire Interface mode and select the BRI port.
2. Enter **isdn switch-type <basic-5ess | basic-dms100 | basic-net3 | basic-ni1 | basic-ntt>** to select the Central Office switch type for the ISDN port.
3. Enter **isdn spid1 <SPID><LDR>** for the SPID (ISDN service) and LDR (local directory) telephone numbers.
4. Enter **isdn spid2 <SPID><LDR>** for a second SPID as needed.
5. Enter **no shutdown** to keep the BRI interface enabled.
6. Enter **dialer pool-member <1-255> priority <0-255>** to add a dialer pool and associated priority to this BRI interface. You can add additional dial pools as needed.
7. Enter **exit** to quit BRI Interface mode.
8. Enter **interface dialer <0-255>** to acquire Interface mode and select the Dialer port.
9. Enter **ip address <xxx.xxx.xxx.xxx/24** to set an IP address for the Dialer port.
10. Enter **encapsulation ppp** to select PPP encoding.
11. Enter **dialer string <phone number> class <Map Class name>** to specify the destination number and associated Map Class.
12. Enter any additional dialer strings as instructed above.
13. Enter **dialer pool <1-255>** to create a dial pool from which the dialer interface will select a physical interface.
14. Enter **show interface** to verify your ISDN and dialer configuration.
15. Enter **no shutdown** to keep the Dialer interface enabled.

Remember to save your configuration after all edits.

ADSL Configuration

ADSL can be configured using three different types of encapsulation: PPPoA, PPPoE, and IPoA. Continue configuration with the ADSL type of your choice.

PPPoE

The following commands configure a sample PPPoE topology. The first set configures the LAN interface with directed broadcasts prohibited.

```
XSR(config)#interface FastEthernet 1
XSR(config-if<F1>)#ip address 192.168.1.1 255.255.255.0
XSR(config-if<F1>)#no ip directed-broadcast
XSR(config-if<F1>)#no shutdown
```

The commands below configure the ATM interface and sub-interface with a negotiated IP address, PAP username and password, and ban keepalives. They also reset default PVC VPI and VCI values to those requested by the DSL provider. Notice that the Maximum Segment Size (MSS) is set to 1400 bytes for TCP SYN (synchronize) packets. Because a PC connected to a Fast/GigabitEthernet port may be unable to access Web sites if its MSS setting is too high, subtracting for the PPPoE, IP, TCP, and GRE headers (6, 20, 20, and 24 bytes, respectively) and the PPP Protocol ID should avoid that problem.

```
XSR(config)#interface ATM 0
XSR(config-if<ATM0/0>)#no shutdown
XSR(config-if<ATM0/0>)#interface ATM 0.1
XSR(config-if<ATM0/0.1>)#no shutdown
XSR(config-if<ATM0/0.1>)#encapsulation mux pppoe
XSR(config-if<ATM0/0.1>)#ip address negotiated
XSR(config-if<ATM0/0.1>)#ip mtu 1492
XSR(config-if<ATM0/0.1>)#ip tcp adjust-mss 1400
XSR(config-if<ATM0/0.1>)#ppp pap sent-username user@net password letmein
XSR(config-if<ATM0/0.1>)#no ppp keepalive
XSR(config-if<ATM0/0.1>)#pvc 0/100
```

The following optional commands configure two default routes:

```
XSR(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.10
XSR(config)#ip route 30.0.0.10 255.255.255.255 ATM 0.1
```

The following optional commands configure NAT:

```
XSR(config)#access-list 99 permit 192.168.1.0 0.0.0.255
XSR(config)#interface FastEthernet 1
XSR(config-if<F1>)#ip nat source list 99 assigned overload
```

PPPoA

Enter the following commands to configure PPPoA. The first set configures the LAN interface with directed broadcasts prohibited.

```
XSR(config)#interface FastEthernet 1
XSR(config-if<F1>)#ip address 192.168.1.1 255.255.255.0
XSR(config-if<F1>)#no ip directed-broadcast
XSR(config-if<F1>)#no shutdown
```

The commands below configure the ATM interface and sub-interface with a negotiated IP address, CHAP username and password, and bans keepalives.

```
XSR(config)#interface ATM 0
XSR(config-if<ATM0/0>)#no shutdown
XSR(config-if<ATM0/0.1>)#interface ATM 0.1
XSR(config-if<ATM0/0.1>)#no shutdown
XSR(config-if<ATM0/0.1>)#encapsulation snap pppoa
XSR(config-if<ATM0/0.1>)#ip address negotiated
XSR(config-if<ATM0/0.1>)#ip mtu 1492
XSR(config-if<ATM0/0.1>)#ip tcp adjust-mss 1400
XSR(config-if<ATM0/0.1>)#ppp chap hostname red password sox
XSR(config-if<ATM0/0.1>)#no ppp keepalive
```

Note: If you have configured a VPN tunnel and wish to avoid intermittent Web browser problems, add the **`crypto ipsec df-bit clear`** command to your configuration.

IPoA

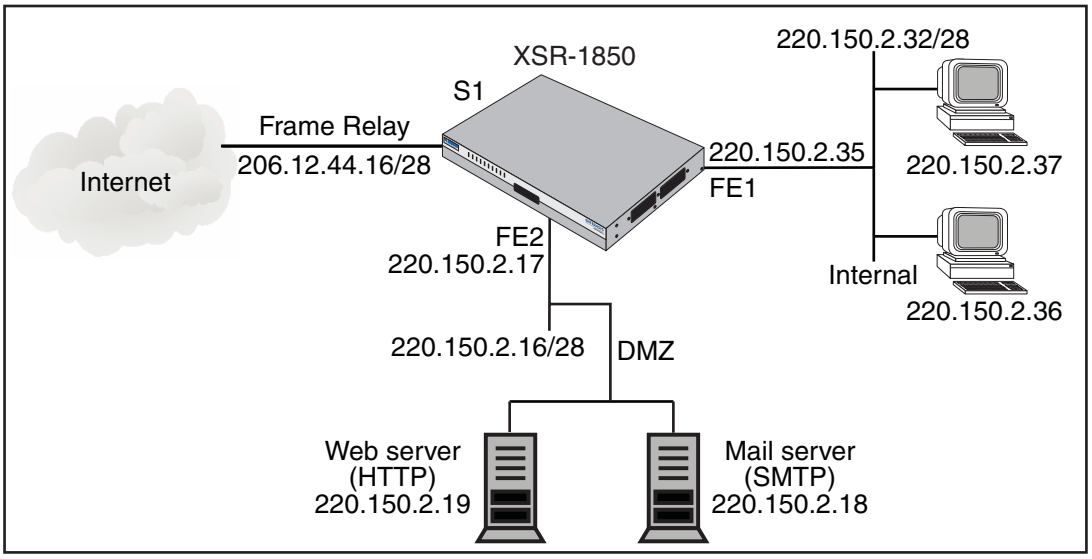
Enter the following commands to configure a IPoA topology:

```
XSR(config)#interface ATM 0
XSR(config-if<ATM0/0>)#no shutdown
XSR(config-if<ATM0/0>)#interface ATM 0.1
XSR(config-if<ATM0/0.1>)#encapsulation snap ipoa
XSR(config-if<ATM0/0.1>)#ip address 192.168.1.1 255.255.255.0
XSR(config-if<ATM0/0.1>)#ip mtu 1492
XSR(config-if<ATM0/0.1>)#exit
XSR(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.10
XSR(config)#ip route 30.0.0.10 255.255.255.255 ATM 0.1
```

Firewall Sample Configuration

In this scenario, the XSR acts as a router connecting a branch office to the Internet, as illustrated in Figure 3-1. The branch office has two servers (Web and Mail) accessible from the external world and an internal network of hosts which are protected from the external world by the firewall. The Web and Mail servers are part of the DMZ and considered internal by the XSR.

Figure 3-1 XSR with Firewall Topology



In this configuration, the firewall provides protected access from the *private* to *dmz* networks. That is, access is restricted to Web and mail traffic only. The hosts in the *private* network are provided full access to the Internet but access is *denied* from the Internet to the private *network*. Also, all Java and ActiveX pages, IP options, IP broadcast and multicast packets are banned.

Begin by specifying network objects for *private, dmz*, and *Mgmt* networks:

```
XSR(config)#ip firewall network dmz 220.150.2.16 mask 255.255.255.240 internal
XSR(config)#ip firewall network private 220.150.2.32 mask 255.255.255.240 internal
XSR(config)#ip firewall network Mgmt 220.150.2.35 mask 255.255.255.0 internal
```

Log only critical events:

```
XSR(config)#ip firewall logging event-threshold 3
```

Set policies between the *dmz* and *external* networks. Note that policy objects and names are *case-sensitive* and you must cite network names *exactly*:

```
XSR(config)#ip firewall policy a1 private dmz HTTP allow
XSR(config)#ip firewall policy a2 dmz private HTTP allow
XSR(config)#ip firewall policy a3 private dmz HTTP allow
XSR(config)#ip firewall policy a4 dmz private HTTP allow
```

Set the policies between the *dmz* and *external* networks:

```
XSR(config)#ip firewall policy a5 ANY_EXTERNAL dmz SMTP allow
XSR(config)#ip firewall policy a6 dmz ANY_EXTERNAL SMTP allow
XSR(config)#ip firewall policy a7 ANY_EXTERNAL dmz SMTP allow
XSR(config)#ip firewall policy a8 dmz ANY_EXTERNAL SMTP allow
```

Set policies to allow any traffic from *private* to *external* and *Mgmt* networks:

```
XSR(config)#ip firewall policy a9 private ANY_EXTERNAL ANY_TCP allow
XSR(config)#ip firewall policy Telnetsess Mgmt Mgmt Telnet allow bidirectional
```

Allow ICMP traffic to pass from the *dmz* to *private*, *private* to *all external, and all external* to *private* networks:

```
XSR(config)#ip firewall filter allowICMP private dmz protocol-id 1
XSR(config)#ip firewall filter allowICMP private ANY_EXTERNAL protocol-id 1
XSR(config)#ip firewall filter allowICMP ANY_EXTERNAL dmz protocol-id 1
```

Trial load the completed configuration into the firewall engine, and if successful, load the configuration:

```
XSR(config)#ip firewall load trial
XSR(config)#ip firewall load
```

Complete LAN and WAN interface configuration:

```
XSR(config)#interface fastethernet 1
XSR(config-if<F1>)#ip address 220.150.2.35 255.255.255.0
XSR(config-if<F1>)#no shutdown

XSR(config)#interface fastethernet 2
XSR(config-if<F2>)#ip address 220.150.2.17 255.255.255.0
XSR(config-if<F2>)#no shutdown

XSR(config)#interface serial 1/0:0
XSR(config-if<S1/0:0>)#ip address 206.12.44.16 255.255.255.0
XSR(config-if<S1/0:0>)#no shutdown
```

Globally enable the firewall. Even though you have configured and loaded the firewall, only invoking the following command "turns on" the firewall. Once enabled, if you are remotely connected, the firewall will close your session. Simply login again.

```
XSR(config)#ip firewall enable
```

For more Firewall configuration examples, refer to the *XSR User's Guide*.

Setting Up RIP Routing

The following commands configure a FastEthernet and Serial interface to support RIP with additional functionality as an option:

1. Enter **interface fastethernet** <*1* | *2*> to acquire Interface mode and select the first or second FastEthernet port.
2. Enter **ip address** <*xxx.xxx.xxx.xxx*> <*yyy.yyy.yyy.yyy*> where *x* is the IP address and *y* is the subnet mask of this FastEthernet port.
3. Enter **no shutdown** to keep the interface enabled.
4. Enter **interface serial** <*slot #* | *card #* | *port #*> of the serial NIM card to re-acquire Interface mode and select slot, card and port numbers.
5. Enter **ip address** <*xxx.xxx.xxx.xxx*> <*yyy.yyy.yyy.yyy*> where *x* is the IP address and *y* is the subnet mask of the serial port.
6. Enter **ip rip authentication mode text** if you want to set clear-text authentication. If you enter this command, continue with the Step 7, otherwise, go to Step 8.
7. Enter **ip rip authentication key-string** <*text*> to specify a text string for authentication.
8. Enter **no shutdown** to keep the interface enabled.
9. Enter **ip rip send version** <*1* | *2*> to allow the RIP version of update transmissions. Version 1 is the default value.
10. Enter **ip rip receive version** <*1* | *2*> to allow a RIP version of updated transmissions. Accept both RIP V1 and V2 is the default value.
11. Enter **router rip** to acquire Router configuration mode and enable RIP routing.

12. Enter **network** <*xxx.xxx.xxx.xxx*> *(IP address)* of the network to be advertised. Repeat the command to configure additional networks.
13. Enter **passive-interface** *type num* if you want to prevent RIP transmissions on the interface.
14. Enter **no receive-interface** if you want to disable reception of RIP updates on the interface.

    Remember to save your configuration after all edits. For more RIP configuration examples, refer to the *XSR User's Manual*.

Configure OSPF Routing

The following OSPF configuration adds two networks to OSPF areas and sets the cost of sending traffic on the serial interface:

1. Enter **interface fastethernet <*1* | **2>** to acquire Interface mode and select the first or second FastEthernet port.
2. Enter **ip address** <*xxx.xxx.xxx.xxx*> <*yyy.yyy.yyy.yyy*> where *x* is the IP address and *y* is the subnet mask of this FastEthernet port.
3. Enter **no shutdown** to keep the interface enabled.
4. Enter **interface serial** <*slot #* | *card #* | *port #*> of the serial NIM card to re-acquire Interface mode and select slot, card and port numbers.
5. Enter **ip address** <xxx.xxx.xxx.xxx> <yyy.yyy.yyy.yyy> where *x* is the IP address and *y* is the subnet mask of the serial port.
6. Enter **no shutdown** to keep the interface enabled.
7. Enter **encapsulation ppp** to set the correct encapsulation type.
8. Enter **ip ospf cost** <*1-65535*> to set the cost of receiving a packet on this interface.
9. Enter **router ospf** to acquire Router configuration mode and enable OSPF routing.
10. Enter **network** <xxx.xxx.xxx.xxx> **area** <*area-id*> of the network to be advertised. Repeat the command to configure additional networks.

    Remember to save your configuration after all edits. For more OSPF configuration examples, refer to the *XSR User's Manual*.

Configuring Frame Relay Point to Point Networks

The following Frame Relay configuration sets up point-to-point networks on *Central* and *Branch* XSRs. On the *Central* XSR, perform these steps:

1. Enter **interface serial** <*slot #* | *card #* | *port #*> of the serial NIM card to acquire Interface mode and select a slot, card and port number.
2. Enter **encapsulation frame-relay** to set the encapsulation type.
3. Enter **no shutdown** to keep the interface enabled.
4. Enter **frame-relay lmi-type** <*ilmi* | *ansi* | *q933a* | *auto* | *none*> to manually select the Link Management Interface protocol type to use on the port or retain the default type *auto*.
5. Enter **media-type V35** to match the correct cabling interface. The default media type for Frame Relay is RS-232.
6. Enter **frame-relay traffic-shaping** to enable congestion control.

7. Enter **map-class frame-relay** <*name*> to designate this map-class and acquire Map-Class mode.
8. Enter **frame-relay cir out** <*bits*> to set the outgoing CIR (the default is 56000 bps). Refer to the *XSR User's Guide* for more details.
9. Enter **frame-relay bc out** <*bits*> to set the Burst size for this map-class. Refer to the *XSR User's Manual* for further directions.
10. Enter **frame-relay be out** <*rate*> to set the excess Burst site for this map-class. Refer to the *XSR User's Manual* for more directions.
11. Enter **interface serial** <*slot #* | *card #* | *port #* | *subinterface#*> <*point*> of the serial NIM card to acquire Sub-interface mode, select the point-to-point connection type and begin configuring this sub-interface.
12. Enter **no shutdown** to enable the sub-interface.
13. Enter **ip address** <*xxx.xxx.xxx.xxx*> <*yyy.yyy.yyy.yyy*> where *x* is the IP address and *y* is the subnet mask of this sub-interface.
14. Enter **frame-relay interface-dlci** <*16 - 1007*> to assign a Data-link Connection Identifier (DLCI) to this sub-interface. DLCIs are provisioned by your service provider.
15. Enter **class** <*name*> to designate the map-class which will be assigned to the earlier specified DLCI. The class name often refers to the speed of the connection such as *SlowLink* for a 64000 bps link.
16. Repeat the previous steps on the *Branch* XSR.

    Remember to save your configuration after all edits. Refer to the *XSR User's Guide* for more information.

Setting Up the Backup Line

1. Enter **interface dialer <***number***>** where number is the same number you entered earlier issuing the backup interface dialer command.
2. Enter **dialer pool <***number***>** to add a pool the dial interface will use.
3. Enter **dialer string <***phone number***>** to create a telephone number to be sent to the dialer.
4. Enter **encapsulation ppp** to set the encapsulation type.
5. Enter **ppp authentication** <*chap* [*ms-chap*] [*pap*] | *pap* [*ms-chap*] [*chap*] | *ms-chap* [*chap*] [*pap*]> for the authentication type on the port.
6. Enter **ip address** <*xxx.xxx.xxx.xxx*> <*yyy.yyy.yyy.yyy*> where *x* is the IP address and *y* is the subnet mask of the interface.
7. Enter **no shutdown** to keep the interface enabled.
8. Enter **interface serial** <*slot/card/port*> of the serial card in the second NIM slot to acquire Interface mode.
9. *Optionally,* you can set up the Console port as a *WAN* interface for dial backup purposes (refer to the Caution below).

Caution: Be aware that when you enable the Console port, you can no longer directly connect to the XSR because it is in data communication mode. Your only CLI access is to Telnet to an IP address of a configured port. Also, if your startup-config file does not set any of the ports properly and sets up the console port as a serial port, you will no longer be able to login and will have to press the Default button to erase your configuration.

10. To set up the Console port as a dial-in port, perform the following:
    - Enter **interface serial 0** to decouple the port from the CLI and acquire Interface mode.
    - Enter **no shutdown** to keep the interface enabled.
11. Enter **`dialer pool-member <`***number***`>`** to set the dialer interface.
12. Enter **`clock rate 38400`** to configure the proper baud rate.
13. Enter **`encapsulation ppp`** for the correct encoding method.
14. Enter **`ip address <address/mask>`** of the interface.
15. Enter **`ppp timeout retry 20`** for the PPP negotiation retry timer.
16. Enter **physical-layer async** to set the interface type.
17. Enter **no shutdown** to keep the interface enabled.
18. Set these switches on the modem: *DTR override* (DTR is ignored), *No echo offline commands*, *Auto answer on first ring*, *Carrier Detect normal*, *Load factory defaults*, and *Dumb mode* (AT command mode disabled.

    Remember to save your configuration after all edits.

Setting Up SNMP Community String, Traps and V3 Values

1. Enter **snmp-server community** <*string*> <*ro* | *rw*> <ACL #> to create an SNMP community with an optional ACL. SNMP is disabled by default, but entering any SNMP configuration command except **snmp-server disable** will enable the SNMP server.

   You can choose either Read Only or Read/Write privileges and can create read-only or read-write community strings. Also, community-based write access is available for the *ct-download* MIB only. For write access to other MIBs, use SNMPv3. Also, a RW community is *unnecessary* for SNMPv3.

   Note: Only standard ACLs can be applied to SNMP configuration commands.

2. Enter **snmp-server host** <*IP address*> **traps** <*community-string* [*snmp*]> to specify where traps are sent.
3. Enter **snmp-server location** <*location-string*> to specify where the SNMP device is sited.
4. Enter **snmp-server enable traps** *snmp authentication* to define which traps are sent.
5. *Optional* . For SNMPv3, enter **`snmp-server group`** <*name*> **`v3`** {*auth* | *nonauth* | *priv*} **`read`** <*name*> **`write`** <*name*> to add a group.

   Groups offer users authorization choices and read/write privileges.

   Note: Because only one operator can set the XSR at any time, you must exit Global mode to perform SNMPv3 configuration. Otherwise, the SNMP set request will fail with the “resource unavailable” message. This rule applies to configuration values, not image downloads.

6. *Optional.* For SNMPv3, enter **`snmp-server view <name>`** {*oid-tree* | *treeEntryName*}{*included* | *excluded*} to specify a view.

   Views offer users selective access to the family tree or Object IDs.

7. *Optional*. For SNMPv3, enter **`snmp-server user`** <*username*> <*group name*> **`v3`** [*encrypted*][*auth* {*md5* | *sha*} **`auth-password`** [*priv des56 priv-password*]]} to add a user.

   Users can have different levels of encryption and passwords.

   Remember to save your configuration after all edits. Refer to the *User's Guide* and *CLI Reference Guide* for more information.

Note: To restart the XSR using NetSight or SNMP management programs, you must enter the **snmp-server system-shutdown** command.

Configuring Message Logging and Severity Level

1. Enter **logging** <*console* | *buffer* | *monitor* | *snmp* | *A.B.C.D* | *file*> <*high* | *medium* | *low* | *debug*> to direct where error messages are sent and what degree of severity they will reflect.

   Messages stored to *buffer* are saved to the XSR's RAM, those stored to *monitor* are displayed on active Telnet CLI sessions, those stored to A.B.C.D. are saved in the IP address of the associated SYSLOG server. See the *XSR CLI Reference* and *User Guide* for more details.

   Typically, only HIGH severity alarms are logged to red flag critical events and those requiring operator intervention. Also, the DEBUG alarm level is meant for maintenance personnel only. The XSR may discard LOW and DEBUG level alarms if the system is too occupied to deliver them. The number of discarded messages is displayed by the following line in **`show logging`** command output:

   ```
   Discards: high=0 medium=0 low=4 debug=22
   ```

2. Enter **show logging** to verify the logging configuration.

   When the XSR has been up and running for a while more data will be shown in this display. For a detailed list of most alarms and events generated by the router, refer to the *XSR User Guide*. Remember to save your configuration after all edits.

Viewing Your Configuration

1. Enter **show running-config** to verify your current configuration.

   Commands you issued up to this point, but not defaults, are shown.

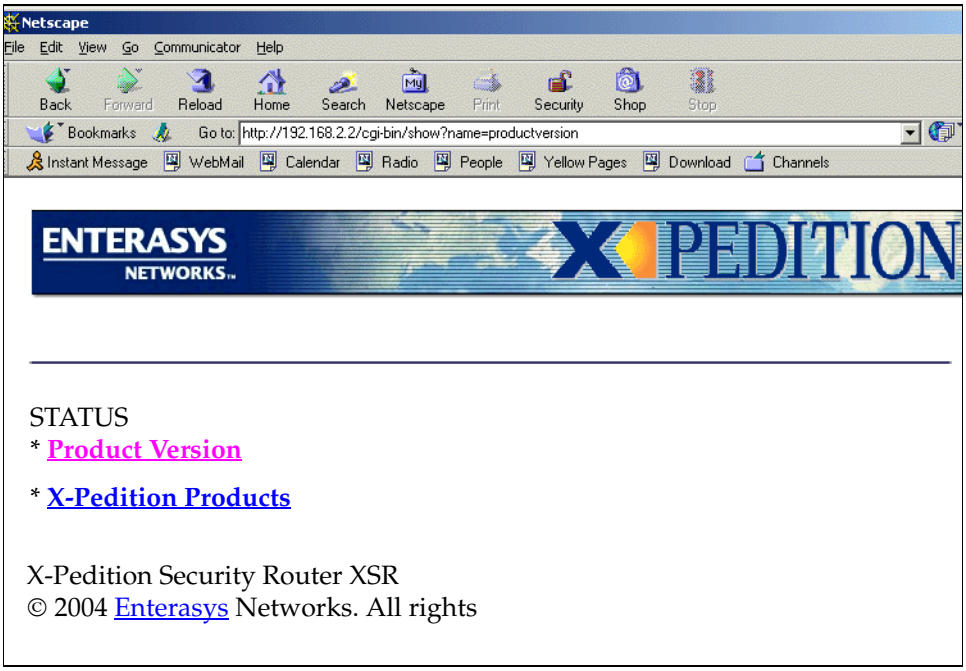
Note: All show commands can be entered in privileged EXEC or Global mode.

Connecting Remotely via the Web

1. Enter **configure** to acquire Configuration mode.
2. Enter **ip http server enable** to access the XSR over the Web.
3. Point your terminal's Web browser at the XSR's IP address. Enter **http://<XSR IP address>**.

   The initial Web access window appears as shown in Figure 3-2.

Figure 3-2 Initial Web Access Window


Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Go to: http://192.168.2.2/cgi-bin/show?name=productversion
Instant Message WebMail Calendar Radio People Yellow Pages Download Channels
ENTERASYS NETWORKS
X-PEDITION
STATUS
* Product Version
* X-Pedition Products
X-Pedition Security Router XSR
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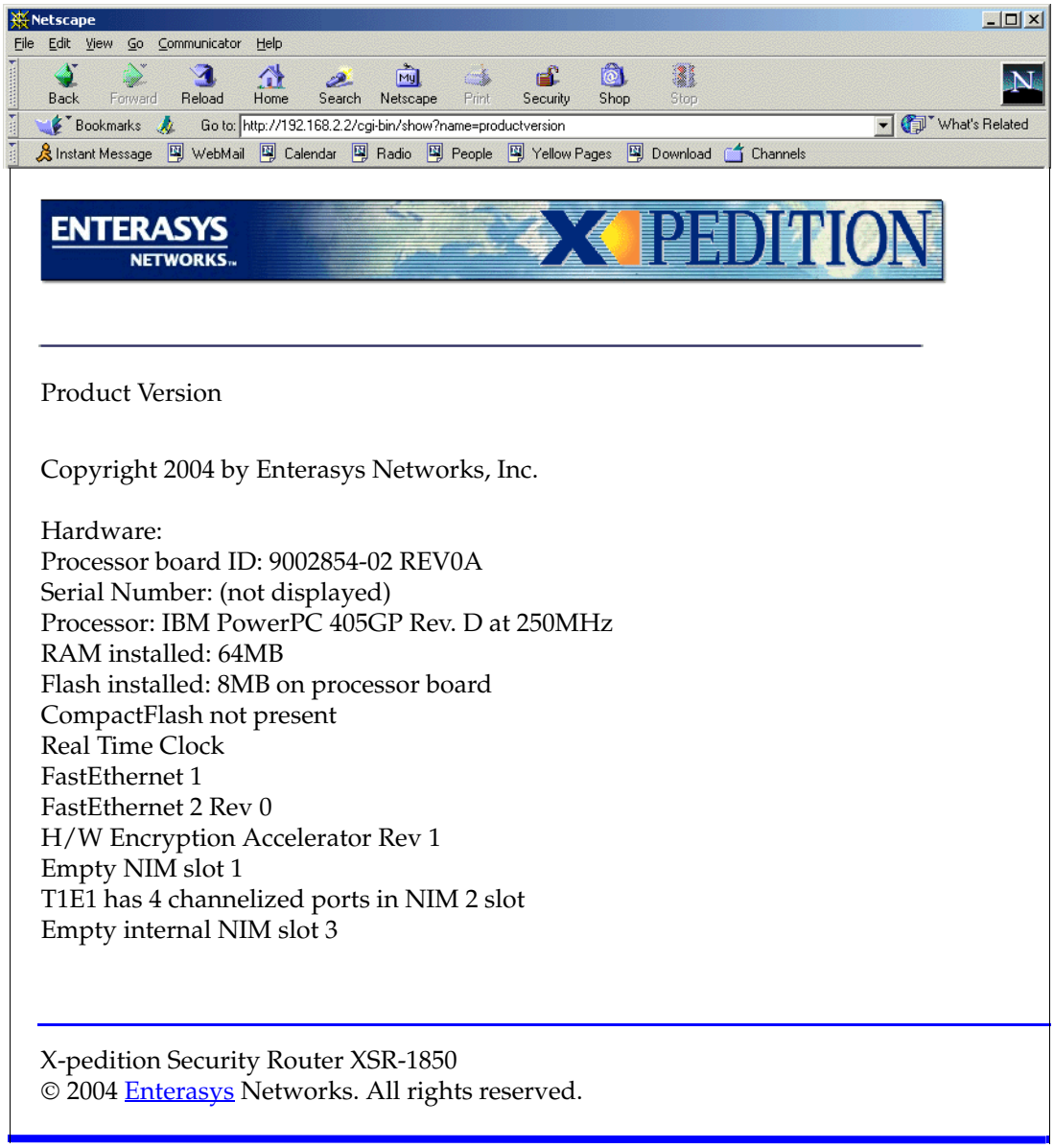
Click on Product Version to bring up the Product Version window for a host of hardware, bootrom, and software information as shown in Figure 3-3.

Figure 3-3 Web Product Version Window


Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Go to: http://192.168.2.2/cgi-bin/show?name=productversion What's Related
Instant Message WebMail Calendar Radio People Yellow Pages Download Channels
ENTERASYS NETWORKS
XPEDITION
Product Version
Copyright 2004 by Enterasys Networks, Inc.
Hardware:
Processor board ID: 9002854-02 REV0A
Serial Number: (not displayed)
Processor: IBM PowerPC 405GP Rev. D at 250MHz
RAM installed: 64MB
Flash installed: 8MB on processor board
CompactFlash not present
Real Time Clock
FastEthernet 1
FastEthernet 2 Rev 0
H/W Encryption Accelerator Rev 1
Empty NIM slot 1
T1E1 has 4 channelized ports in NIM 2 slot
Empty internal NIM slot 3
X-pedition Security Router XSR-1850
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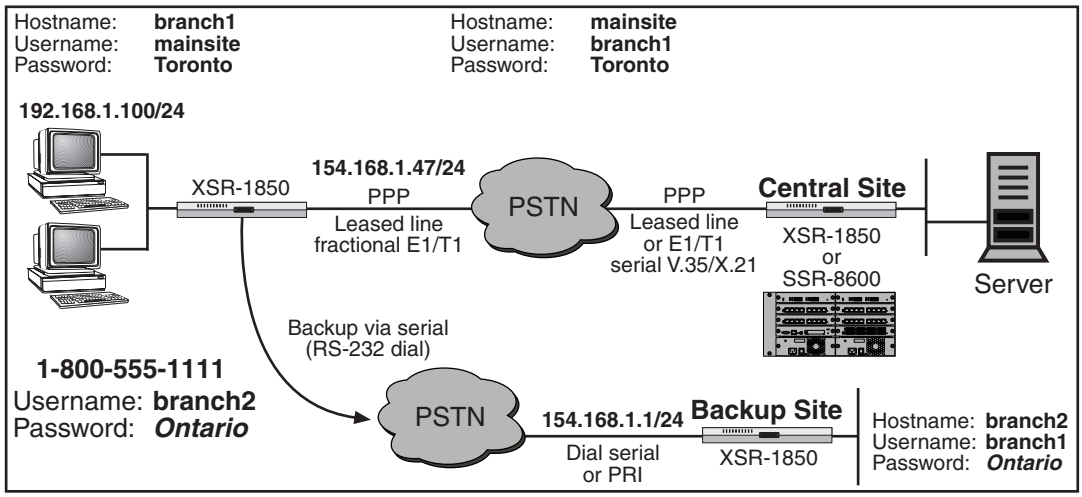
LAN-PPP Services Sample Configuration

The sample configuration below, see Figure 3-4, creates a PPP, fractional T1 leased line connection from the XSR branch node to the Central Site router and a backup serial dialup link to the Backup Site regional router.

Figure 3-4 Sample LAN-PPP Services Configuration



The following script configures the LAN-PPP services topology shown above.

```
XSR>enable
```
+ *Acquires Privileged EXEC mode*

```
XSR#configure
```
+ *Acquires Global configuration mode*

```
XSR(config)#hostname branch1
```
+ *Configures the local hostname*

```
XSR(config)#username mainsite password secret 0 Toronto
```
+ *Configures first username and password for CHAP*

```
XSR(config)#username branch2 password secret 0 Ontario
```
+ *Configures second username and encrypted password for CHAP*

```
XSR(config)#interface fastethernet 1
```
+ *Configures local LAN interface and acquires Interface mode*

```
XSR(config-if<F1>)#ip address 192.168.1.100 255.255.255.0
```
+ *Enables IP address for FastEthernet interface*

```
XSR(config-if<F1>)#no shutdown
```
+ *Enables the interface*

```
XSR(config)#controller t1 0/1/0
```
+ *Sets up main link connection: T1 NIM in slot 1, port 0 and acquires Controller mode*

```
XSR(config-controller<T1-1/0>)#clock source line
```
+ *Sets external clocking of T1 NIM*

```
XSR(config-controller<T1-1/0>)#no channel-group 0
```
+ *Deletes default channel setup*

```
XSR(config-controller<T1-1/0>)#channel 0 timeslot 1-4,7,9-15
```
+ *Adds channel group 0 mapping to time slots 1-4, 7, and 9-15*

```
XSR(config-controller<T1-1/0>)#framing esf
```
+ *Begins configuring T1 channel values: sets T1 line frame type*

```
XSR(config-controller<T1-1/0>)#linecode b8zs
```
+ *Sets T1 encoding*

```
XSR(config-controller<T1-1/0>)#no shutdown
```
+ *Enables T1 controller*

```
XSR(config)#interface serial 1/0:0
```
+ *Configures Serial interface 1, port 1 using channel group 0 and acquires Interface mode*

```
XSR(config-if<S1/0:0>)#encapsulation ppp
```
+ *Enables PPP encapsulation*

```
XSR(config-if<S1/0:0>)#ppp authentication chap
```
+ *Configures CHAP authentication on the interface*

```
XSR(config-if<S1/0:0>)#ip address 154.68.1.47 255.255.255.0
```
+ *Enables IP address for serial interface 1/0*

```
XSR(config-if<S1/0:0>)#backup interface dialer 5
```
+ *Sets dialed interface as a dialed backup*

```
XSR(config-if<S1/0:0>)#no shutdown
```
+ *Enables the interface*

```
XSR(config)#router rip
```
+ *Enables RIP routing and goes to Router mode*

```
XSR(config-router)#network 192.168.1.100
```
+ *Configures a network RIP will advertise its routes to*

```
XSR(config-router)#network 154.68.1.0
```
+ *Configures a second network RIP will advertise its routes to*

```
XSR(config-router)#network 164.55.7.0
```
+ *Configures a third network RIP will advertise its routes to*

```
XSR(config)#interface dialer 5
```
+ *Adds backup interface and acquires Interface mode*

```
XSR(config-if<D5>)#dialer pool 3
```
+ *Adds a dialer pool on interface*

```
XSR(config-if<D5>)#dialer string 18005555555
```
+ *Sets backup phone #*

```
XSR(config-if<D5>)#encapsulation ppp
```
+ *Enables PPP encapsulation on port*

```
XSR(config-if<D5>)#ppp authentication chap
```
+ *Sets CHAP on port*

```
XSR(config-if<D5>)#ip address 164.55.7.22 255.255.255.0
```
+ *Enables the IP address for dialer interface 5*

```
XSR(config-if<D5>)#no shutdown
```
+ *Enables the interface*

```
XSR(config)#interface serial 2/0
```
+ *Configures backup interface: Serial card in slot 2, port 0 and acquires Interface mode*

```
XSR(config-if<S2/0>)#dialer pool-member 3
```
+ *Adds a dial pool*

```
XSR(config-if<S2/0>)#physical-layer sync
```
+ *Sets synchronous mode*

```
XSR(config-if<S2/0>)#no shutdown
```
+ *Enables the interface*

Frame Relay WAN Link with PPP Backup Sample Configuration

The sample configuration below, similar to the preceding configuration except that the cloud supporting the primary line is Frame Relay rather than Public Service Telephone Network, configures one LAN port, the Frame Relay WAN, QoS, OSPF routing, DHCP Relay, IP broadcast forwarding, SNMP with ACL rules, and access lists.

Configure Users and Passwords

XSR>enable

+ *Acquires Privileged EXEC mode*

XSR#configure

+ *Acquires Global configuration mode*

XSR(config)#username bob password cleartext bobspassword

+ *Adds a user and unencrypted password*

Configure LAN Interface

XSR(config)#interface fastethernet 1

+ *Configures the local LAN port and acquires Interface mode*

XSR(config-if<F1>)#ip address 192.168.1.100 255.255.255.0

+ *Enables the IP address for the FastEthernet port*

XSR(config-if<F1>)#no shutdown

+ *Enables the interface*

Configure Quality of Service

XSR(config)#access-list 129 permit udp 192.168.1.0 0.0.0.255 any eq 554

+ *Adds a UDP filter matching the source network and any destination address to port 554*

XSR(config)#access-list 129 permit tcp 192.168.1.0 0.0.0.255 any eq 554

+ *Adds a TCP filter allowing the source network and any destination address to port 554*

XSR(config)#access-list 130 permit ip any host 192.168.2.75

+ *Adds an IP filter allowing any source address to the specified destination address*

XSR(config)#access-list 131 permit tcp any any eq 20

+ *Adds a TCP filter allowing any source address and destination address to port 20*

XSR(config)#access-list 132 permit tcp any any eq 21

+ *Adds a TCP filter allowing any source and destination address to port 21*

XSR(config)#access-list 133 permit tcp any any eq 80

+ *Adds a TCP filter allowing any source and destination address to port 80*

XSR(config)#class-map rtp-class

+ *Adds a class-map and acquires Class Map mode*

XSR(config-cmap<rtp-class>)#match access-group 129

+ *Assigns ACL 129 to this class map*

XSR(config)#class-map priority-server

+ *Adds a class-map and acquires Class Map mode*

XSR(config-cmap<priority-server>)#match access-group 130

+ *Assigns ACL 130 to this class map*

XSR(config)#class-map match-any data_class

+ *Adds a class-map and acquires Class Map mode*

XSR(config-cmap<data_class>)#match access-group 131

+ *Assigns ACL 131 to this class map*

XSR(config-cmap<data_class>)#match access-group 132

+ *Assigns ACL 132 to this class map*

XSR(config-cmap<data_class>)#match access-group 133

+ *Assigns ACL 133 to this class map*

XSR(config)#policy-map priority-policy

+ *Adds a policy map and acquires Policy Map mode*

XSR(config-pmap<priority-policy>)#class rtp_class

+ *Adds a queue for this policy map and acquires Class sub-mode*

XSR(config-pmap-c<priority-policy>)#priority high 30 3200

+ *Gives this high priority queue a peak 30% of bandwidth and burst size of 3200 bits per second*

XSR(config-pmap-c<priority-policy>)#set ip dscp ef

+ *Configures IP precedence to match packets with Expedited Forwarding*

XSR(config-pmap<priority-policy>)#class priority-server

+ *Adds another queue for this policy map and enters Class sub-mode*

XSR(config-pmap-c<priority-server>)#priority medium 20 6400

+ *Gives medium priority queue a peak 20% bandwidth and burst size of 6400 bits per second*

XSR(config)#policy-map data_policy

+ *Adds a policy map and acquires Policy Map mode*

XSR(config-pmap<data_policy>)#class data_class

+ *Adds a queue for this policy map and acquires Class sub-mode*

XSR(config-pmap-c<data_class>)#police 24000 2400 4800 conform-action transmit exceed-action set-dscp-transmit 23 violate-action drop

+ *Sets traffic policing at an average rate of 24000 bits per second, a normal burst size of 2400 bits per second, and an excess burst size of 4800 bits per second. Packets conforming to values are sent, those exceeding are set to a DSCP value of 23 and those violating values are dropped.*

XSR(config-pmap-c<data_class>)#bandwidth percent 50

+ *Gives the class a minimum 50% of the bandwidth*

Configure WAN/Frame Relay Port

This port's IP address is 154.68.1.47. The attached switch operates at 128,000 bps, with *auto* LMI type, and traffic shaping enabled. Any QoS values set will be applied to the DLCIs: do not apply QoS to the port, it is not recommended on Frame Relay connections..

XSR(config)#interface serial 1/0

+ *Configures Frame Relay interface: Serial card in slot 1, port 0 and acquires Interface mode*

XSR(config-if<S1/0>)#media-type v35

+ *Selects type for Frame Relay*

XSR(config-if<S1/0>)#no shutdown

+ *Enables the interface*

XSR(config-if<S1/0>)#encapsulation frame-relay

+ *Enables FR encapsulation*

XSR(config-if<S1/0>)#frame-relay class CLASS-FRP

+ *Adds a FR map class*

XSR(config-if<S1/0>)#frame-relay traffic-shaping

+ *Enables map class values*

XSR(config)#interface serial 1/0.1 multipoint

+ *Adds FR port: serial card in slot 1, port 0, sub-interface 1 for multipoint connections and acquires Interface mode*

XSR(config-if<S1/0.1>)#frame-relay interface-dlci 33

+ *Adds PVC #33*

XSR(config-if<S1/0.1-33>)#no shutdown

+ *Enables the DLCI port*

XSR(config-if<S1/0.1-33>)#ip address 154.68.1.47 255.255.255.0

+ *Configures the IP address of the port*

XSR(config)#interface serial 1/0.2 multipoint

+ *Configures FR port: Serial card in slot 1, port 0, sub-interface 2 for multipoint links and acquires Interface mode*

XSR(config-if<S1/0.2>)#frame-relay class CLASS_SI

+ *Adds another FR map class*

XSR(config-if<S1/0.2>)#frame-relay interface-dlci 16

+ *Adds PVC #16 and acquires DLCI 16 sub-mode*

XSR(config-if<S1/0.2-16>)#class CLASS_DLCI

+ *Assigns the specified map class to DLCI 16*

XSR(config-if<S1/0.2-16>)#ip address 154.68.2.1 255.255.255.0

+ *Configures the IP address of DLCI 16*

```
XSR(config-if<S1/0.2-16>)#no shutdown
```
+ *Enables DLCI 16 interface*

Apply QoS

```
XSR(config)#map-class frame-relay CLASS-FRP
```
+ *Adds a FR map class and acquires FR Map Class mode*

```
XSR(config-map-class<CLASS-FRP>)#frame-relay cir out 48000
```
+*Sets this map class' CIR rate at 48000 bits per second*

```
XSR(config-map-class<CLASS-FRP>)#frame-relay bc out 4000
```
+ *Sets this map class' committed burst size to 4000 bits*

```
XSR(config-map-class<CLASS-FRP>)#frame-relay be out 3000
```
+ *Sets this map class' excess burst size to 3000 bits*

```
XSR(config-map-class<CLASS-FRP>)#frame-relay adaptive-shaping
```
+ *Enables BECN (traffic shaping) for this map class*

```
XSR(config-map-class<CLASS-FRP>)#service-policy output data_policy
```
+ *Attaches this policy to the map class*

```
XSR(config)#map-class frame-relay CLASS-SI
```
+ *Adds another FR map class and acquires Frame Relay Map Class mode*

```
XSR(config-map-class<CLASS-SI>)#frame-relay cir out 30000
```
+ *Sets this map class' CIR rate at 30,000 bits per second*

```
XSR(config-map-class<CLASS-SI>)#frame-relay bc out 5000
```
+ *Sets this map class' committed burst size to 5000 bits*

```
XSR(config-map-class<CLASS-SI>)#frame-relay be out 3000
```
+ *Sets this map class' excess burst size to 3000 bits*

```
XSR(config-map-class<CLASS-SI>)#frame-relay adaptive-shaping
```
+ *Enables BECN (traffic shaping) for this map class*

```
Router(config-map-class<CLASS-SI>)#service-policy HighOutput
```
+ *Attaches this policy to the map class*

```
XSR(config)#map-class frame-relay CLASS-DLCI
```
+ *Adds another Frame Relay map class and acquires Frame Relay Map Class mode*

```
XSR(config-map-class<CLASS-DLCI>)#frame-relay cir out 50000
```
+ *Sets this map class' CIR rate at 50,000 bits per second*

```
XSR(config-map-class<CLASS-DLCI>)#frame-relay bc out 4000
```
+ *Sets this map class' committed burst size to 4000 bits*

```
XSR(config-map-class<CLASS-DLCI>)#frame-relay be out 1000
```
+ *Sets this map class' excess burst size to 1000 bits*

```
XSR(config-map-class<CLASS-DLCI>)#frame-relay adaptive-shaping
```
+ *Enables BECN (traffic shaping) for this map class*

```
XSR(config-map-class<CLASS-DLCI>)#service-policy output priority-policy
```
+ *Attaches this policy to the map class*

Configure OSPF Routing

```
XSR(config)#router ospf 1
```
+ *Enables OSPF with a router ID and acquires Router mode*

```
XSR(config-router)#network 192.168.1.0 0.0.0.255 area 0.0.0.10
```
+ *Configures the area ID for the specified network*

```
XSR(config-router)#network 154.68.1.0 0.0.0.255 area 0.0.0.0
```
+ *Configures another area ID for the specified network*

Configure More Access Lists

The following ACLs deny any packets to or from network 192.168.1.15 as they enter or leave FastEthernet 1 interface, and permit traffic to or from subnet 192.168.2.*xx* while denying any other traffic.

```
XSR(config)#access-list 125 deny ip any host 192.168.1.15
XSR(config)#access-list 125 deny ip host 192.168.1.15 any
XSR(config)#access-list 125 permit ip 192.162.2.0 0.0.0.255 any
XSR(config)#access-list 125 permit ip 192.162.2.0 0.0.0.255
XSR(config)#interface fastethernet 1
XSR(config-if<F1>)#ip access-group 125 in
XSR(config-if<F1>)#ip access-group 125 out
```

Configure DHCP/BOOTP Relay

```
XSR(config)#interface fastethernet 1
```
+ *Adds Fastethernet port 1 and acquires Interface mode*

```
XSR(config-if<F1>#ip helper-address 192.168.1.120
```
+ *Marks destination IP address for UDP broadcasts*

Configure the Dial Backup Connection

```
XSR(config)#interface ser 1/0
```
+ *Adds serial port 1, acquires Interface mode*

```
XSR(config-if<S1/0>)#encapsulation ppp
```
+ *Enables PPP encapsulation*

```
XSR(config-if<S1/0>)#ip address 192.31.27.80 255.255.255.0
```
+ *Sets the IP address on the interface*

```
XSR(config-if<S1/0>)#backup int dialer 1
```
+ *Adds a backup dialer interface*

```
XSR(config-if<S1/0>)#backup delay 2 2
```
+ *Sets the interval that elapses after the primary interfaces fails and comes up*

```
XSR(config-if<S1/0>)#no shutdown
```
+ *Enables the interface*

```
XSR(config)#interface serial 2/0
```
+ *Adds serial port 2, acquires Interface mode*

```
XSR(config-if<S2/0>)#dialer pool-member 1
```
+ *Adds a dial pool member*

```
XSR(config-if<S2/0>)#physical-layer sync
```
+ *Sets synchronous mode*

```
XSR(config-if<S2/0>)#no shutdown
```
+ *Enables the interface*

```
XSR(config)#int dialer 1
```
+ *Adds dialer interface, acquires Dialer Interface mode*

```
XSR(config-if<D1>)#encapsulation ppp
```
+ *Enables PPP encapsulation*

```
XSR(config-if<D1>)#ip address 192.31.27.84 255.255.255.0
```
+ *Sets the IP address on the interface*

```
XSR(config-if<D1>)#dialer string 4165557922
```
+ *Sets dialer phone #*

```
XSR(config-if<D1>)#dialer wait-for-carrier 30
```
+ *Specifies the period the XSR will wait for a connection from the service provider*

```
XSR(config-if<D1>)#di pool 1
```
+ *Specifies the dial pool from which calls originate*

```
XSR(config-if<D1>)#no shutdown
```
+ *Enables the dial interface*

Configure SNMP

ACL 26 is created to be permit SNMP traffic from host 192.168.2.32. Stricter ACLs can be written if tighter security controls are required.

```
XSR(config)#access-list 26 permit host 192.168.2.32
```

```
XSR(config)#snmp-server community toMonitor1 ro 26
```
+ *Adds an SNMP community with read-only privileges attached to ACL 26*

```
XSR(config)#snmp-server community toConfigure1 rw 26
```
+ *Adds another SNMP community with read-write privileges attached to ACL 26*

```
XSR(config)#snmp-server enable traps
```
+ *Enables traps to be transmitted*

```
XSR(config)#snmp-server contact support@enterasys.com
```
+ *Specifies contact information for the management server*

```
XSR(config)#snmp location "HQ 2nd floor"
```
+ *Specifies the server locationr*

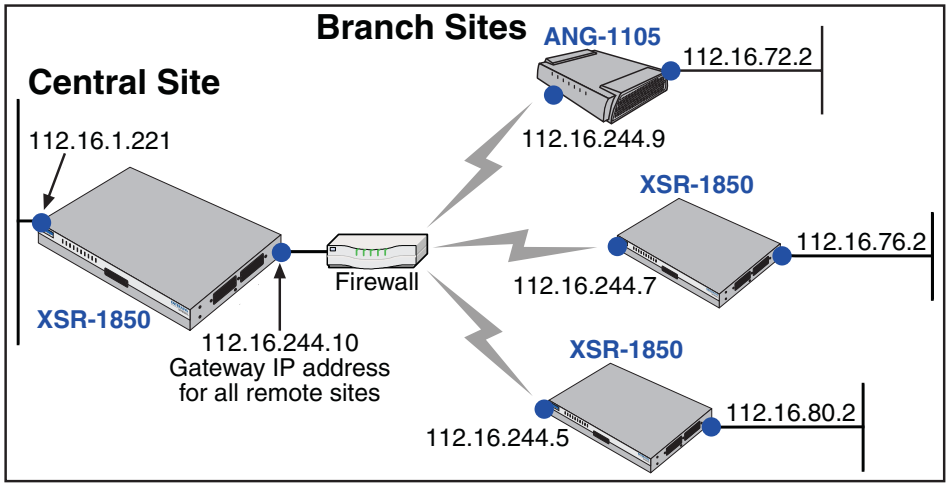
```
XSR(config)#snmp-server host 192.168.2.101 traps trapCommunity
```
+ *Specifies management station to send traps to*

```
XSR(config)#snmp-server host 192.168.2.102 traps trapCommunity
```
+ *Specifies another management station to send traps to*

VPN Site-to-Site Sample Configuration

The following VPN topology, shown in Figure 3-5, configures a central site XSR to connect over IPSec tunnels with a remote ANG-1105 and two XSRs.

Figure 3-5 VPN Site-to-Site Topology



Generate Master Encryption Key

If you have not already generated a master encryption key, you should do so now to configure the VPN. A master key need only be generated once.

Caution: The master encryption key is stored in hardware, not Flash, and you cannot read the key - only overwrite the old key by writing a new one. To ensure router security, it is critical not to compromise the key. There are situations where you may want to keep the key, for example, to save the user database off-line in order to later download it to the XSR. In order to encrypt the user database, you need the same master key, indicating the key designation with the master key specify command. Be aware that if the XSR is inoperable and you press the Default button, the master key is erased and you must generate a new one.

Generate the master key:

```
XSR(config)#crypto key master generate
New key is 2173 4521 3764 2ff5
             163b 4bdf fe92 dbc1
             1232 ffe0 f8d9 3649
```

Configure Access Control Lists

ACL 101 configured below is strongly restrictive in denying all but IKE traffic (*well-known* UDP port # 500) through the router. ACLs 190, 191, and 192 are crypto map filters configured to accept any IPSec-encrypted traffic over site-to-site tunnels and pass that traffic to the three specified networks only.

```
XSR(config)#access-list 101 permit udp any any eq 500
XSR(config)#access-list 101 permit udp esp any any
XSR(config)#access-list 101 permit udp ah any any
XSR(config)#access-list 101 deny ip any any
XSR(config)#access-list 190 permit ip any 112.16.72.0 0.0.0.255
XSR(config)#access-list 191 permit ip any 112.16.76.0 0.0.0.255
XSR(config)#access-list 192 permit ip any 112.16.80.0 0.0.0.255
```

Set Up IKE Phase I Security

The following proposal sets pre-shared authentication and MD5 hashing:

```
XSR(config)#crypto isakmp proposal acme
XSR(config-isakmp)#authentication pre-share
XSR(config-isakmp)#hash md5
```

Configure IKE Policy for Remote Peer

The following proposal specifies the XSR's remote peer IP address as *any peer* matching its IKE policy, sets NAT to *automatically* detect routers performing NAT between tunnel endpoints and directs the XSR to switch on UDP encapsulation when found. It also designates the peer as a *gateway* which will initiate the configuration mode in terms of IKE negotiation:

```
XSR(config)#crypto isakmp peer 0.0.0.0 0.0.0.0
XSR(config-isakmp-peer)#proposal acme
XSR(config-isakmp-peer)#config-mode gateway
XSR(config-isakmp-peer)#nat-traversal automatic
```

Create a Transform Set

The following transform-set specifies the specified encryption/data integrity choices, *768-bit* Diffie-Hellman, and an SA lifetime expressed in *kilobytes*. The SA *seconds* lifetime value is disabled. Some commands are abbreviated.

```
XSR(config)#cry ips transform-set esp-3des-sha esp-3des esp-sha-hmac
XSR(cfg-crypto-tran)#set pfs group1
XSR(cfg-crypto-tran)#set security-association lifetime kilobytes 100000
XSR(cfg-crypto-tran)#no set security-association lifetime seconds
```

Configure Crypto Maps

The IKE policy crypto maps below are linked to the earlier added transform-set with matching ACLs and are set by default for the more stringent *tunnel mode*. Maps 91 and 92 match the remote XSRs and map 90 correlates with the ANG. Crypto map statements render the associated ACLs bi-directional.

```
XSR(config)#crypto map acme 92
XSR(config-crypto-m)#set transform-set esp-3des-sha
XSR(config-crypto-m)#match address 192
XSR(config-crypto-m)#set peer 112.16.244.5

XSR(config)#crypto map acme 91
XSR(config-crypto-m)#set transform-set esp-3des-sha
XSR(config-crypto-m)#match address 191
XSR(config-crypto-m)#set peer 112.16.244.7

XSR(config)#crypto map acme 90
XSR(config-crypto-m)#set transform-set esp-3des-sha
XSR(config-crypto-m)#match address 190
XSR(config-crypto-m)#set peer 112.16.244.9
```

Configuring VPN at Interface Mode and Setting Up RIP

The following commands configure the LAN physical ports as follows: FastEthernet port 1 is designated *Internal LAN*, with the specified IP address/subnet as the designated network. FastEthernet port 2 is named *VPN Cloud*, assigned crypto map *acme* with associated ACLs, and directed not to transmit or receive RIP updates. Also, RIP routing and four IP routes are configured as well as a VPN interface for AAA service.

```
XSR(config)#interface fastethernet 1
XSR(config-if<F1>)#description "Internal LAN"
XSR(config-if<F1>)#no shutdown
XSR(config-if<F1>)#ip address 112.16.1.221 255.255.255.0

XSR(config)#interface fastethernet 2
XSR(config-if<F2>)#crypto map acme
XSR(config-if<F2>)#description "VPN Cloud"
XSR(config-if<F2>)#no shutdown
XSR(config-if<F2>)#ip access-group 101 in
XSR(config-if<F2>)#ip access-group 101 out
XSR(config-if<F2>)#ip address 112.16.244.10 255.255.255.0
```

```
XSR(config)#interface vpn 57 multi-point
XSR(config-int-vpn)#ip address 192.168.2.1 255.255.255.0

XSR(config)#router rip
XSR(config-router)#network 112.16.10.0
XSR(config-router)#passive-interface fastethernet 2
XSR(config-router)#no receive-interface fastethernet 2
XSR(config-router)#distribute-list 1 out vpn 1

XSR(config)#ip route 0.0.0.0 0.0.0.0 112.16.244.9
XSR(config)#ip route 112.16.72.0 255.255.255.0 112.16.244.9
XSR(config)#ip route 112.16.76.0 255.255.255.0 112.16.244.7
XSR(config)#ip route 112.16.80.0 255.255.255.0 112.16.244.5
```

Configuring Authentication (AAA)

Configure an AAA user and DEFAULT AAA group for remote users. When an ANG tunnels into the XSR, it will be assigned dynamically to the IP pool *AUTH*. Be aware that groups must be created before users can be added to them. Remember to create the same users and passwords on the ANG. The IP address assigned to the AAA user is the remote gatewayIP address.

```
XSR(config)#ip local pool AUTH 192.168.2.0 255.255.255.0
XSR(config)#aaa user 112.16.244.9
XSR(aaa-user)#password dribble
XSR(aaa-user)#group DEFAULT
XSR(aaa-group)#pptp encrypt mppe auto
XSR(aaa-group)#ip pool AUTH
XSR(aaa-group)#policy vpn
```

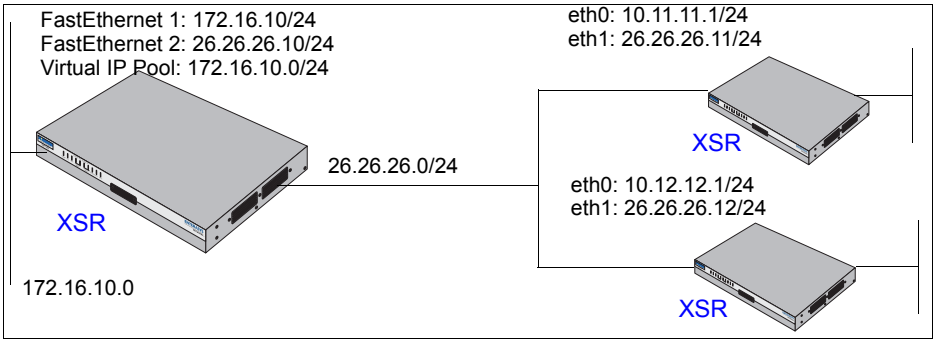
VPN Sample Configuration with Network Extension Mode

The following sample topology is ideal for testing a VPN NEM tunnel connection on a LAN before actually configuring a production network. If the configuration works properly, simply change the FastEthernet settings to the Serial or T1 interface values of your choice.

The XSR below is configured as a VPN concentrator with Internet access allowed and Network Extension Mode (NEM) tunnels set up. NEM is designed to open up network resources situated behind the XSR. You configure NEM to provide routing for nodes connected to the trusted port of the router so that locally and remotely connected devices can discover and communicate with each other across an IKE/IPSec tunnel.

The XSR's EZ-IPSec functionality is employed to automatically access default ESP transforms and IPSec proposals. The following script configures the VPN topology shown in Figure 3-6.

Figure 3-6 VPN Topology with NEM, EZ-IPSec and Internet Access



If you have not already generated a master encryption key, you should do so now to configure the VPN. After the key is generated and displayed in unencrypted form at the prompt, copy and save it in a file stored on a PC. A master key need only be generated once.

Caution: The master encryption key is stored in hardware, not Flash, and you cannot read the key - only overwrite the old key by writing a new one. To ensure security, it is critical not to compromise the key. There are situations where you may want to keep the key, for example, to save the user database off-line in order to later download it to the XSR. In order to encrypt the user database, you need the same master key, indicating the key designation with the master key specify command. Be aware that if the XSR is inoperable and you press the Default button, the master key is erased and you must generate a new one.

Generate the master key, as shown by this sample:

```
XSR(config)#crypto key master generate

New key is 2173 4521 3764 2ff5
           163b 4bdf fe92 dbc1
           1232 ffe0 f8d9 3649
```

Apply the following ACLs to the public interface of the XSR before creating the VPN configuration. These ACLs are applied only to an XSR configured to terminate Network Extension Mode (NEM) tunnels initiated from ANG-1100s. These ACLs allow all outbound IP traffic and established inbound TCP traffic and employ well-known protocol numbers for IKE UDP (500) and ICMP to and from the public interface (if preferred).

```
XSR(config)#access-list 1 deny 26.26.26.0 0.0.0.255
XSR(config)#access-list 1 permit any
XSR(config)#access-list 110 permit udp any any eq 500
XSR(config)#access-list 110 permit icmp any host 26.26.26.10
XSR(config)#access-list 110 deny ip any any
XSR(config)#access-list 111 permit udp any any eq 500
XSR(config)#access-list 111 permit icmp host 26.26.26.10 any
XSR(config)#access-list 111 deny ip any any

XSR(config)#interface fastethernet 2
XSR(config-if<F2>)#ip access-group 110 in
XSR(config-if<F2>)#ip access-group 111 out
```

Enable Network Address Translation:

```
XSR(config-if<F2>)#ip nat source assigned overload
```

Create the VPN virtual subnet:

```
XSR(config)#ip local pool virtual_subnet 10.10.10.0 255.255.255.248
```

Configure AAA authentication by assigning a virtual subnet to the DEFAULT AAA group, associate it with DNS and WINs servers, and add two AAA users with passwords.

When a remote XSR tunnels into the local XSR, it will be assigned these DNS, WINS and PPTP values and be assigned dynamically to IP pool *virtual_subnet*. Be aware that users not added to a specified group will automatically be assigned to the DEFAULT group and groups must be created before users can be added to them. Remember to create the same users and passwords on the remote XSRs.

```
XSR(ip-local-pool)#aaa group DEFAULT
XSR(aaa-group)#ip pool virtual_subnet
```

Configure DNS and WINS parameters:

```
XSR(aaa-group)#dns server primary 172.16.10.10
XSR(aaa-group)#dns server secondary 172.16.10.11
XSR(aaa-group)#wins server primary 172.16.10.10
XSR(aaa-group)#wins server secondary 172.16.10.11
```

Create user(s), specify an IP from virtual subnet, and assign a password:

```
XSR(config)#aaa user nem-test
XSR(config)#password welcome
XSR(config)#aaa user jeffb
XSR(config)#password welcome
```

Check to make sure the transforms and proposals were created properly:

```
Router#show crypto ipsec transform-set
 Name                        PFS       ESP      ESP-AH     AH  IPCOMP
 ----                        ---       ---      ------     --  ------
*ez-esp-3des-sha-pfs        Modp768   3DES     HMAC-SHA   None       None
*ez-esp-3des-sha-no-pfs     Disabled  3DES     HMAC-SHA   None       None
*ez-esp-3des-md5-pfs        Modp768   3DES     HMAC-MD5   None       None
*ez-esp-3des-md5-no-pfs     Disabled  3DES     HMAC-MD5   None       None
*ez-esp-aes-sha-pfs         Modp768   AES      HMAC-SHA   None       None
*ez-esp-aes-sha-no-pfs      Disabled  AES      HMAC-SHA   None       None
*ez-esp-aes-md5-pfs         Modp768   AES      HMAC-MD5   None       None
*ez-esp-aes-md5-no-pfs      Disabled  AES      HMAC-MD5   None       None

XSR#show crypto isakmp proposal
 Name                 Authentication  Encrypt  Integrity  Group     Lifetime
 ----                 --------------  -------  ---------  -----     --------
*ez-ike-3des-sha-psk  PreSharedKeys   3DES     HMAC-SHA   Modp1024     28800
*ez-ike-3des-md5-psk  PreSharedKeys   3DES     HMAC-MD5   Modp1024     28800
*ez-ike-3des-sha-rsa  RSASignature    3DES     HMAC-SHA   Modp1024     28800
*ez-ike-3des-md5-rsa  RSASignature    3DES     HMAC-MD5   Modp1024     28800
```

Create the ISAKMP IKE global peer:

```
XSR#crypto isakmp peer 0.0.0.0 0.0.0.0
XSR#config-mode gateway
XSR#exchange-mode aggressive
XSR#proposal ez-ike-3des-sha-psk ez-ike-3des-md5-psk
```

Create the ACL for trusted subnet of the XSR and virtual subnet of XSR:

```
XSR(config)#access-list 101 permit ip any 10.11.11.0 0.0.0.255
XSR(config)#access-list 102 permit ip any 10.12.12.0 0.0.0.255
```

```
XSR(config)#access-list 103 permit ip any 10.10.10.0 0.0.0.255
```

Create crypto maps for each ACL entry with the more protective *tunnel* mode set by default. *Match* statements render associated ACLs bi-directional:

```
XSR(config)#crypto map test 101
XSR(config)#set transform-set ez-esp-3des-sha-pfs
XSR(config)#match address 101

XSR(config)#crypto map test 102
XSR(config)#set transform-set ez-esp-3des-sha-pfs
XSR(config)#match address 102

XSR(config)#crypto map test 103
XSR(config)#set transform-set ez-esp-3des-sha-pfs
XSR(config)#match address 103
```

Create the multi-point VPN virtual port required to terminate many clients:

```
XSR(config)#interface vpn1 multi-point
XSR(config)#description "VPN Virtual Interface Int0"
XSR(config)#ip address 10.10.10.1 255.255.255.0
XSR(config)#ip rip send version 2
XSR(config)#ip rip receive version 2
XSR(config)#ip multicast-redirect tunnel-endpoint
```

Enable RIP routing on all networks *except* the public interface:

```
XSR(config)#router rip
XSR(config-router)#network 172.16.10.0
XSR(config-router)#network 10.0.0.0
XSR(config-router)#passive-interface fastethernet2
XSR(config-router)#no receive-interface fastethernet2
XSR(config-router)#distribute-list 1 out vpn1
```

Finally, attach the crypto map statement to the public interface:

```
XSR(config-router)#interface fastethernet 2
XSR(config-if<F2>)#crypto map test
XSR#copy running-config startup-config
```

XSR Rebooting Characteristics

When the XSR reboots, it conforms to the behavior described in this section. The output displayed at the CLI describes router initialization.

Initialization Output

The XSR displays the following output when it initializes (cold reboot):

```
X-Pedition Security Router Bootrom
Copyright 2002 Enterasys Networks Inc.

HW Version: 9002854-02 REV0A Serial Number: 0001F4000102
CPU: IBM PowerPC 405GP Rev. D
VxWorks version: 5.4
Bootrom version: 1.20
```

```
Creation date: Oct 19 2002, 12:39:02

Cold Start : SystemReset watchdog ChipReset from pwr

auto-booting...

Unpacking flash:XSR1800.FLS file
File chksum=0x0
SW image size=9543664 sum=0xb5b2 compressed_size=2916334 entry=0x10000
Diagnostics size=874252 sum=0x64b8 compressed_size=281490 entry=0x10000
Extracting Diagnostics at offset=0x2c8012 ...
Inflating 281490 bytes ...
Verifying uncompressed chksum ...
Starting at 0x10000...

Attaching interface lo0...done

Executing Startup Diagnostics Rev. 2.03

Memory Size Detected [32-Meg].....................<< PASSED >>
Memory Test (200000 - 1e80000).....................<< PASSED >>
Testing Compact Flash.....................................<< PASSED >>
Checking Presence of Flash Bank [0] 8-Meg Intel Flash Detected << PASSED >>
Checking Presence of Flash Bank [1] 4-Meg Intel Flash Detected << PASSED >>
Checking Presence of Flash Bank [2] 2-Meg Intel Flash Detected << PASSED >>
Checking Presence of Flash Bank [3] 2-Meg Intel Flash Detected << PASSED >>
Testing VPN...............................................<< PASSED >>
Testing PCI Elan Port.....................................<< PASSED >>
Testing 405 Elan Port.....................................<< PASSED >>
Testing RTC...............................................<< PASSED >>
Testing T1E1 NIM in Slot 1................................<< PASSED >>
Testing T1E1 NIM in Slot 2...............................<Not Installed>
Testing T1E1 NIM in Slot 3...............................<Not Installed>
Testing Serial NIM in Slot 1.............................<Not Installed>
Testing Serial NIM in Slot 2..............................<< PASSED >>
Testing Serial NIM in Slot 3.............................<Not Installed>
Testing ISDN PMC in Slot [1] ............................<Not Installed>
Testing ISDN PMC in Slot [2] ............................<Not Installed>
Testing ISDN PMC in Slot [3] ............................<Not Installed>


Exiting Diagnostics....

                X-Pedition Security Router Bootrom
               Copyright 2003 Enterasys Networks Inc.

HW Version: 9002854-02 REV0A Serial Number: 0001F4000102
CPU: IBM PowerPC 405GP Rev. D
VxWorks version: 5.4
Bootrom version: 1.20
```

```
Creation date: Oct 19 2002, 12:39:02

Cold Start : SystemReset from power up

auto-booting...

Unpacking flash:XSR1800.FLS file
File chksum=0x0
SW image size=9543664 sum=0xb5b2 compressed_size=2916334 entry=0x10000
Diagnostics size=874252 sum=0x64b8 compressed_size=281490 entry=0x10000
Extracting System Image at offset=0x24 ...

Inflating 2916334 bytes ...
Verifying uncompressed chksum ...
Starting at 0x10000...

Attached TCP/IP interface to Eth unit 1
Attaching interface lo0...done

Restoring startup configuration files, please wait

Startup configuration files have been restored.

login:
```

Reboot Triggers

Although there are two types of reboots of the XSR - warm or cold - reboots can be triggered in up to eight different ways. Refer to the table below.

Table 1 Reboot Triggers

Cause	Boot Type
Power-up	Cold
CLI reload	Cold or Warm
SNMP reload	Cold or Warm
Watchdog Expiration	Warm
Software Crash	Warm
Repetitive Software Crash	Cold
ROM Monitor	Cold or Warm
Invalid SW text checksum	Warm

Power-Up Reboot

If you power cycle the XSR by flipping the switch on the back panel, the XSR will cold reboot. The **`startup-config`** file stored in Flash becomes the running configuration.

Reload Command from the CLI

You can reboot the XSR firmware by issuing the command **`reload <cold | warm>`**. You are then prompted to confirm the command. Once the firmware is reloaded, the configuration is loaded from the startup-config file.

Bootrom Monitor Commands bc and bw

Using Bootrom Monitor mode, you can activate warm or cold reboots by entering **`bw`** or **`bc`**, respectively. Refer to "Bootrom Monitor Mode Commands" on page 3-36 for more data.

Watchdog Timer Expiration

When the internal watchdog timer expires, causing the XSR to fail, fault information is captured in a report and a warm boot is initiated. But if more than three warm boots are detected within one minute, a cold boot will be initiated.

System Crash

When system exceptions occur causing the XSR to fail, fault information is captured in a report and a warm boot is initiated. But if more than three warm boots are detected within one minute, a cold boot will be initiated.

Restart with Default Configuration Interrupt

When you press the Default button on the back panel, the XSR restarts using factory default parameters, ignoring the **`startup-config`** file.

Power-up Error Conditions

After power-up, the XSR comes up automatically if:

- The minimum hardware is functional: Processor, RAM and FLASH memory, and other components.
- Bootrom is valid.
- The software image in Flash is valid.

Bootrom Monitor Mode Commands

Bootrom monitor mode offers special user access when the XSR lacks valid software or runs abnormally. Enter the mode by pressing the key combination (**`CTRL-C`**) during the first five seconds of initialization. After you access the mode, list command groups by typing **`h`** to show the text below:

```
b       Boot
f       Files
n       Network
```

```
s      Status
t      Time and Date
D      For Development Only
```

All the commands in each group can be listed by entering the command group letter. The main menu provides the following functions:

- Reboot warm or cold
- Update Bootrom
- File system-related commands for the Flash ROM file system
- Modify network parameters
- Various status/show commands
- Version number
- Hardware information
- Display crash info
- Display or change date and time on real-time clock if present
- Commands for development use only

bc

This command initiates a *cold* reboot.

bw

This command initiates a *warm* reboot.

bp

This command changes the Bootrom password. The default password is blank. You are prompted to enter a password by the following script:

```
XSR-1800:bp
Enter current password:
Enter new password: ******
Re-enter new password: ******
Password has changed.
```

If the Bootrom password is lost you can restore it by pressing the Default button. Be aware that when pressed, the Default button erases all configuration files and the master encryption key.

bu

This command updates the bootrom from a local file. You are prompted to enter data by the following script. When the "**`Proceed with erasing Bootrom in flash`** ..." statement appears, enter **`y`**. Be sure not to interrupt the process or power down the XSR or it may be affected adversely. After you have updated this file, you can delete it from Flash to conserve space for other files.

```
XSR-1800: bu cflash:bootrom1_20.fls
Checking cflash:bootrom1_20.fls...
```

```
Updating bootrom with file, "cflash:bootrom1_18.fls".
Proceed with erasing current Bootrom in flash and replace with
cflash:bootrom2_02.fls? y
**************************************************
*   Do not interrupt or power down until complete!  *
**************************************************

Erasing 8 sectors at address=0xfff00000
Programming 130816(0x1ff00) bytes at address 0xfff00100
Programming 131072(0x20000) bytes at address 0xfff20000
Programming 131072(0x20000) bytes at address 0xfff40000
Programming 131072(0x20000) bytes at address 0xfff60000
Programming 131072(0x20000) bytes at address 0xfff80000
Programming 131072(0x20000) bytes at address 0xfffa0000
Programming 31320(0x7a58) bytes at address 0xfffc0000
Programming high branch instruction at address 0xfffffffc
Verifying Bootrom flash sectors
Locking 8 Bootrom flash sectors

*****   Bootrom update completed.   *****

Using default Bootrom password.  The system is not secure!!!
Use "bp" to change password

XSR-1800:
```

bU

This command updates the bootrom through a network transfer to a local file. Be sure to enter the **U** in uppercase. After you have updated this file, you can delete it from Flash to conserve space for other files.

cd

This command changes the current directory in the file system to **flash:** or **cflash:**.

copy

This command copies a file using the syntax **copy <source name> <destination name>**. You can copy files from *flash:* to *cflash:* and vice versa.

da

This command shows system date/time with the sample output below:

```
XSR-1800: da
Date: Saturday, 14-OCT-2002.
Time: 04:46:36
```

df

This command shows free disk space. Sample output is shown as follows:

```
XSR-1800: df
Free space on flash: is 3383296 bytes (0x33a000).
```

del

This command removes a file from **flash:** or **cflash:** memory.

dir

This command lists the contents of the current directory in long format. The command displays the following sample output:

```
XSR-1800: dir

  size          date       time       name
--------       ------     ------    --------
  817496    SEP-17-2002  15:21:32   bootrom1_18.fls
 3220453    SEP-17-2002  15:24:08   xsr1800.fls
     917    SEP-17-2002  15:25:00   startup-config
     308    SEP-17-2002  15:26:14   user.dat
     572    SEP-17-2002  15:27:46   cert.dat
       0    SEP-17-2002  15:26:54   leases.cfg
      64    SEP-17-2002  15:27:46   dhcpd.cfg

    2328576(0x238800) bytes free on flash:
```

ds

This command sets the system date with the syntax **yyyy mm dd w (1=Sunday)**. For example:

```
XSR-1800: ds 2002 12 31 3
```

dt

This command sets the system time using the syntax **hh mm ss**. E.g.:

```
XSR-1800: ds 11 59 59
```

ff

This command formats the Flash file system. We recommend that you first save any **.dat, .cert, .cfg**, and your **startup-config** files to **cflash:** or a PC since any files in **flash:** will be deleted. You are prompted to enter data by the following script:

```
XSR-1800: ff
You will lose all files in the “flash:” file system.
Are you sure you want to format the “flash:” file system? (y/n) y
Unlocking flash file sectors
Initializing DOS file system.
```

```
Formatting flashrom file system
.................................................... Done.
Set working directory to flash:

Using default Bootrom password. The system is not secure!!!
Use "bp" to change password
```

ffc

This command formats the CompactFlash card.

ng

This command retrieves a file over the network using a remote IP address/file path.

np

This command modifies network parameters. You are prompted to enter data by the following script. While most of the options are self-explanatory, three require further description.

- When set to *no*, the *Autoboot* option places the prompt in Bootrom mode when you boot or power up the XSR.
- When set to *yes*, the default *Quickboot* action of delaying five seconds at startup for you to optionally enter CTRL-C and acquire Bootrom mode is negated. You can still acquire Bootrom mode, but you must immediately press CTRL-C upon seeing the *X-Pedition Security Router Bootrom* header.
- The default hostname (local target name), *XSR-1800*, cannot be changed. In the absence of a user-supplied hostname via the **hostname** CLI command, this name will be used as the CLI prompt and SNMP hostname in MIB-II.

```
XSR-1800: np

Enter '.' = clear a field; '-' = go to previous field;  ^C = quit

Local IP address (192.168.1.1) :
Gateway IP address () :
Remote Host IP address (192.168.1.10) :
Remote file path (c:\) :
Use TFTP (no) :
Ftp userid (anonymous) :
Ftp password () :
Local target name (robo1) :
Autoboot (yes) :
Quick boot (no) :

Permanently save the network parameters? (y/n)
```

ns

This command saves a file over the network using a remote IP address/file path.

remove

This command removes a file using the syntax **remove <source name> <destination name>**

rename

This command renames a file using the syntax **rename <source name> <destination name>**

sb

This command displays boot values. Sample output is shown as follows:

```
XSR-1800: sb
Current boot file is xsr1800.fls
Boot selector default is flashrom, compactFlash, network
Available Network boot devices:   Eth1
```

sf

This command shows a fault report. Sample output is shown as follows:

```
XSR-1800: sf
No fault report at 0x1feef00
```

si

This command displays system inventory. Sample output is shown as follows:

```
XSR-1800: si

IBM PowerPC 405GP Rev. D
Processor speed   = 200 MHz
PLB speed         = 100 MHz
OPB speed         = 33 MHz
Ext Bus speed     = 25 MHz
PCI Bus speed     = 33 MHz (Sync)
Internal PCI arbiter enabled

RAM installed: 32MB
Flash installed: 8MB on processor board
CompactFlash: SunDisk SDP 5/3 0.6 has 32047104 bytes
Real Time Clock
FastEthernet 1
FastEthernet 2 Rev 0
H/W Encryption Accelerator Rev 1
T1E1 has 4 channelized ports on NIM slot 1. Rev 0
ISDN BRI has 2 ST ports in NIM slot 2. Rev 1
Empty internal NIM slot 3

System up for 345 seconds.
```

sn

This command shows network values with the following sample output:

```
XSR-1800: sn

wLocal IP address   : 10.120.112.33
 Gateway IP address :
 Remote IP address  : 10.120.112.88
 Remote file path   :
 Transfer Protocol  : TFTP
 Local target name  : robo1
 Autoboot           : enabled
 Quick boot         : no

Current FastEthernet 0 MAC address is: 00:01:f4:01:01:01
Current FastEthernet 1 MAC address is: 00:01:f4:01:01:02
```

sv

This command shows the bootrom version with sample output below:

```
XSR-1800: sv

                  X-Pedition Security Router Bootrom
                  Copyright 2002 Enterasys Networks Inc.

HW Version: 9002854-02 REV0A  Serial Number: 0001F4000102
CPU: IBM PowerPC 405GP Rev. D
VxWorks version: 5.4
Bootrom version: 1.20
Creation date: Oct 23 2002, 14:37:37
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A

Specifications

System Specifications

This appendix details XSR data about hardware functionality including:

- Processor, system memory, chassis, power supply, interfaces
- Required cabling, CompactFlash and other accessories
- Pinout assignments for WAN and LAN interfaces
- LED behavior

Refer to tables throughout this appendix for specific information.

Table A-1 XSR Hardware Specifications

Category		Parameters
Processor	Type	IBM PowerPC© 405GP
	Core Operating Speed	440 MIPS @ 266 Mhz (Dhrystone 2.1 MIPS)
VPN accelerator	Type	SafeNet 1140 (30 Mbps) for 3DES encryption, Message Digest (MD-5, SHA-1), and public key acceleration.
System Memory	RAM	100-pin SDRAM DIMM connector for 64 Mbytes (default) of 100 MHz memory modules
	Non-Volatile	8 Mbytes of Onboard Flash
		Up to 1 Gbyte optional plug-in CompactFlash card. Type I and II CF cards supported
Chassis	Form Factor	Rack-mountable
	Dimensions	19” 1.5U (2.5” high by 14” wide by 10.625” deep)
Cooling	Two fans	50 Watts (maximum) of heat dissipation
Environment	Operating Temperature	5 - 40° C
	Storage Temperature	-20 - 85° C
	Relative Humidity	5% - 95%, non-condensing
Power Consumption	Typical values	XSR-1805 motherboard: 18 Watts Serial NIM card: 4 Watts T1/E1/ISDN-PRI NIM card: 3 Watts ISDN BRI-S/T NIM card: 1 Watt

Table A-1 XSR Hardware Specifications (continued)

Category		Parameters
Redundant Power System & Power Chassis	Dimensions	Power System: 5” long by 4” wide by 1.4” high Power Chassis: 1.72” high (1U) by 19” wide by 11” deep
	Weight	Power System: 1.75 lbs Power Chassis: 8.5 lbs
	AC Input Voltage/Freq.	90 - 264 VAC (47-63 Hz) [same for internal power supply]
	Power Consumption	Total power: (100 - -240~ Volts) 25 Watts
	+5.1V DC output	7A maximum, 35.7 Watts maximum [same as internal]
	+12V DC output	1A maximum, 12 Watts maximum [same as internal]
	-12V DC output	.2A maximum, 2.4 Watts maximum [same as internal]
	Operating Temperature	0 - 40° C
	Non-Operating temp.	-40 - 70° C
	Relative Humidity	5% - 90%, non-condensing
	MTBF	> 150,000 hours
I/O Interfaces	Onboard (LAN)	2 10/100Base-T Ethernet ports with RJ-45 connectors
		RS-232 Console serial port with DB-9 connector
	NIM (WAN) Slots	Dual or Quad synch/asynch Serial ports with DB-type connector also supporting X.21, V.35, EIA-449, EIA-232/530 & combined V.35/EIA-232/530 DTE interfaces with adapter
		Single, dual, or quad T1/E1 RJ-48C port(s) with integral CSU/DSU. Full-channel, fractional or unchannelized.
		Single port T3/E3 un-channelized NIM with BNC connectors
		Dual or quad port BRI/PRI S/T NIM (RJ-45) or U NIM with RJ-45 or RJ-49C connectors, respectively.
		Single port Annex A/C or B ADSL NIM with RJ-11 connector. Includes CompactFlash card
		Dual port T1/E1 Drop and Insert NIM with RJ-45 connectors
I/O Interfaces	NIM (LAN or WAN)	Single port 10/100Base-T Copper or 10/100Base-F Fiber-optic Ethernet NIM with RJ-45 connector or MT-RJ multi- mode interface, respectively.
Chassis LEDs	10	Display port and system status, warn of Flash upgrade

Cable, CompactFlash and Accessory Specifications

Refer to the following table for specifications of cables, CompactFlash and accessories for the XSR. This equipment can all be obtained separately from Enterasys Networks or through any computer supply retailer.

Table A-2 XSR Cabling/Accessory Guide

Part Description	Connector	Part #	Function
6' DB-9 null modem cable	DB-9, male	N/A from Enterasys	Console link to serial line
.58 - 10 meter 10/100BaseT straight-through or cross-over cables	RJ-45	N/A from Enterasys	Ethernet link to hub/switch or PC/uplink ports
100 or 120-ohm, straight-through/twisted-pair cables	T1/E1 Port	N/A from Enterasys	Link to T1/E1 lines
2-port synch/asynch card 4-port synch/asynch card	68-pin, male SCSI III	NIM-SER-02 NIM-SER-04	Serial NIM cards
Redundant Power System	1 DC output	XSR-RPOWER-1850	Redundant power supply
Passive Power Chassis	1 AC input, 4 independent DC outputs	XSR-RCHASSIS	Enclosure for multiple supplies
2' DC cable harness	DC	5601850	XSR-power supply connection
6' DB-15, X.21 DTE, twisted-pair cable	68-pin, male SCSI III	NIM-X21-CAB-04	Serial link to high speed serial line: 2 or 4 port
6' DB-25, EIA-232/530 DTE twisted-pair cable		NIM-232-CAB-04	
6' DB-37, EIA-449 DTE, twisted-pair cable		NIM-449-CAB-04	
6' DB-V.35 DTE, twisted-pair cable		NIM-V35-CAB-04	
Combined V.35/EIA-232/530 DTE, twisted-pair cable		NIM-DBU1-CAB-04	
-Single unchannelized T1/E1 card -Dual unchannelized T1/E1 card -Quad unchannelized T1/E1 card	RJ48C RJ48C RJ48C	NIM-T1/E1-01 NIM-T1/E1-02 NIM-T1/E1-04	T1/E1 NIM card
-Single channelized T1/E1/ISDN-PRI card -Dual channelized T1/E1/ISDN-RI card -Quad channelized T1/E1/ISDN-RI card	RJ48C RJ48C RJ48C	NIM-CT1/E1-PRI-01 NIM-CT1/E1-PRI-02 NIM-CT1/E1-PRI-04	Single channelized PRI card Dual channelized PRI card Quad channelized PRI card
Single unchannelized T3/E3 card	2 female BNCs	NIM-T3E3-01	Single unchannelized T3/E3 NIM
1-port ISDN BRI-S/T card 2-port ISDN BRI-S/T card	RJ-45 RJ-45	NIM-BRI-ST-01 NIM-BRI-ST-02	BRI-S/T NIM card BRI-S/T NIM card
1-port ISDN BRI-U card 2-port ISDN BRI-U card	RJ49C RJ49C	NIM-BRI-U-01 NIM-BRI-U-02	BRI-U NIM card BRI-U NIM card
1-port Annex A/C ASDL card with CompactFlash 1-port Annex B ASDL card with CompactFlash	RJ-11 RJ-11	NIM-ADSL-AC-01 NIM-ADSL-B-01	ADSL NIM card ADSL NIM card
2-port T1/E1 D&I card	RJ-45	NIM-DIRELAY-02	T1/E1 D&I NIM card
1-port Copper Ethernet card 1-port Fiber-optic card	RJ-45 MT-RJ	NIM-ETHR-01 NIM-FIBR-01	Copper Ethernet NIM card Fiber-optic Ethernet NIM card
75-ohm coaxial to 120-ohm adapter	2 female BNCs & 1 RJ-48C port	9372192	G.703 Balun adapter for E1 line
Grounding shunt	P2 - P5	N/A from Enterasys	Insulator for E1 line

Table A-2 XSR Cabling/Accessory Guide (continued)

Part Description	Connector	Part #	Function
Auxiliary Flash RAM: 1.4”L x 1.6” W -8, 16, 32 MByte card	Front panel slot	N/A from Enterasys	CompactFlash card for greater software storage and flexibility
128 MByte DIMM memory card upgrade	100-pin, female DIMM	XSR-128mb-MEM	Greater tunnel support
Rack-mount kit	Chassis screws	XSR-1850-RKMT	Mounts chassis on rack
Base firmware	-	XSR-RS	Controls XSR-1850
Firewall and VPN firmware	-	XSR-FW-UPG	Firewall upgrade to VPN code
VPN and Firewall firmware	-	XSR-VPN-UPG	VPN upgrade to firewall code

Console Port

The XSR comes equipped with a serial port useful for initial configuration.

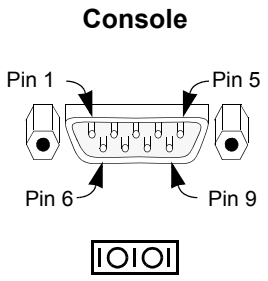
Using a serial (null modem) cable, you can attach the router's DB-9 Console port to a data terminal port and directly configure the XSR over the asynchronous connection. Then, open a Microsoft HyperTerminal or Telnet session to communicate with the router. If you use HyperTerminal, set the connection properties as follows:

- Connect using: Direct to COM*x* (where *x* is an unused COM port)
- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: none

Note: The XSR default login is *Admin* with no password.

Refer to Figure A-1 for pinout assignments.

Figure A-1 Console Port Pinouts



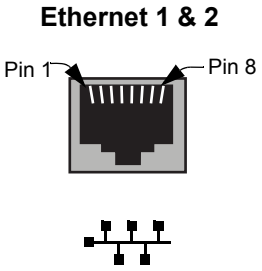
Pin	Signal
1	Carrier Detect (CD)
2	Receive Data (RX)
3	Transmit Data (TX)
4	Data Term Ready (DTR)
5	Ground (GND)
6	Data Set Ready (DSR)
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	Ring Indicator (RI)

Ethernet Ports

The XSR comes equipped with two Ethernet (LAN) 10/100Base-T ports that support full-duplex 10 or 100 Mbps transmission. Both ports conform to IEEE 802.3 standards with 8-pin modular RJ-45 connectors. A cross-over cable is used to connect the XSR directly to a PC or uplink port while a straight-through cable is used to attach the router to a hub or switch.

Refer to Figure A-2 for pinout assignments.

Figure A-2 Ethernet Port Pinouts



Pin	Signal
1	Transmit +
2	Transmit -
3	Receive +
4	Not used
5	Not used
6	Receive -
7	Not used
8	Not used

Copper/Fiber-optic Ethernet NIMs

The single-port Copper or Fiber-optic Ethernet NIMs, shown in Figure A-3 and Figure A-4, provide interfaces for half and full-duplex 10/100Base-T or fiber-optic 100Base-F transmission over LAN or WAN networks, respectively. The Copper Ethernet NIM incorporates a standard 8-pin modular RJ-45 connector and the Fiber-optic Ethernet NIM has an MT-RJ multi-mode interface. Both NIMs conform to IEEE 802.3 and PCI 2.2 standards.

Figure A-3 Copper Ethernet NIM

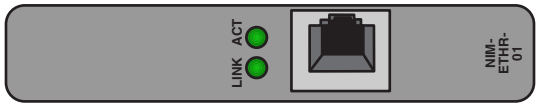
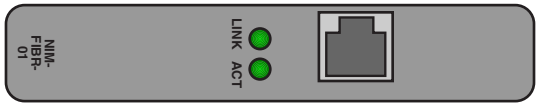
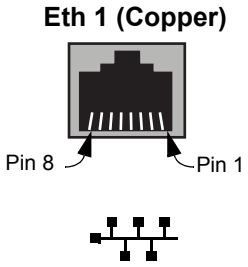


Figure A-4 Fiber-optic Ethernet NIM



Refer to Figure A-5 for Copper Ethernet NIM pinout assignments.

Figure A-5 Copper Ethernet NIM Port Pinouts



Pin	Copper Signal
1	Tx Data +
2	Tx Data -
3	Rx Data +
4	Not Used
5	Not Used
6	Rx Data -
7	Not Used
8	Not Used

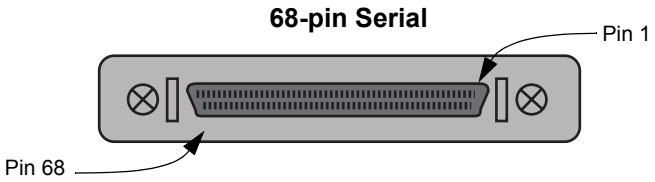
Regulatory/Safety Compliance

The Copper and Fiber-optic Ethernet NIMs comply with these requirements: IEE 802.3, UL 1950, CSA No. 950, EN 60950, and IEC 950 (CB Scheme Report).

2/4-Port Serial NIM Card Port

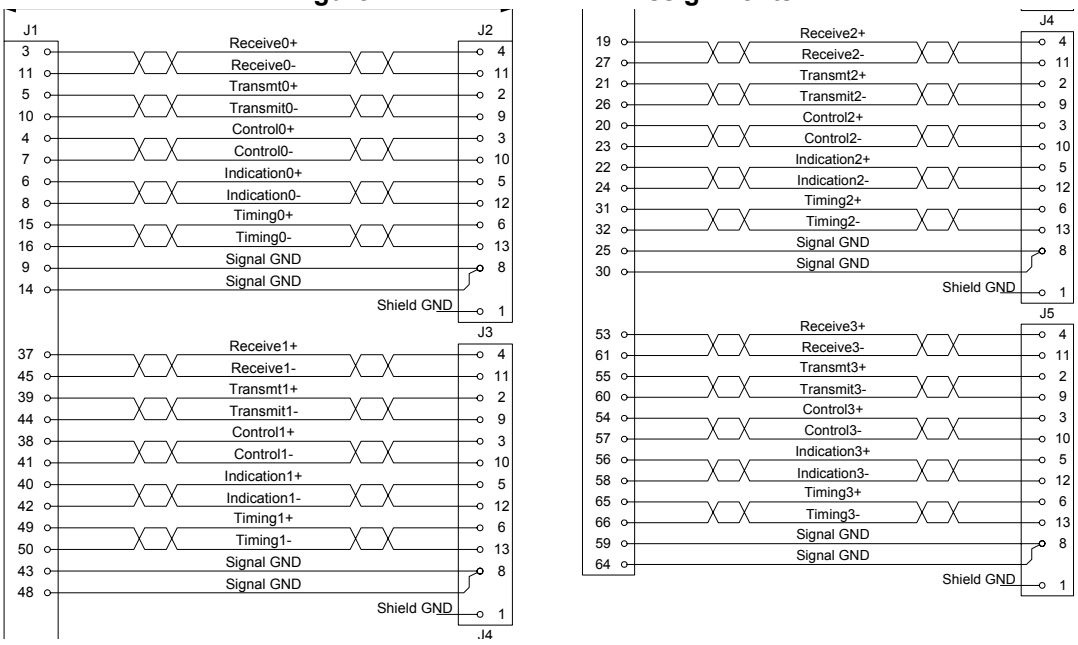
The High Speed Serial NIM card, as shown in Figure A-6, provides a WAN connection to four different types of DTEs: DB-15, 25, 37, and V.35. This interface can support dual and quad traffic up to 8 Mbps.

Figure A-6 High Speed Serial NIM Port



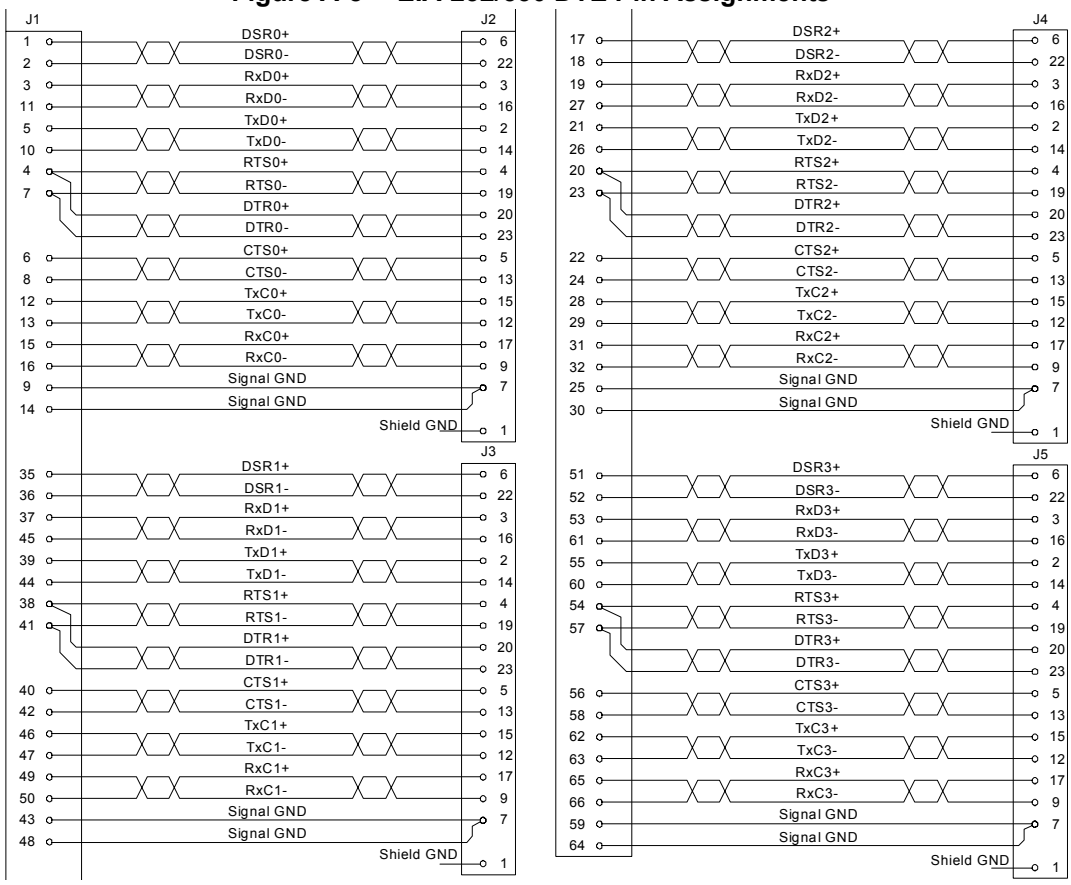
Refer to Figure A-7 through Figure A-11 for pinout assignments.

Figure A-7 X.21 DTE Pin Assignments



J1: 68-pin male SCSI II type connector
J2 - J5: DB-15 type male connector

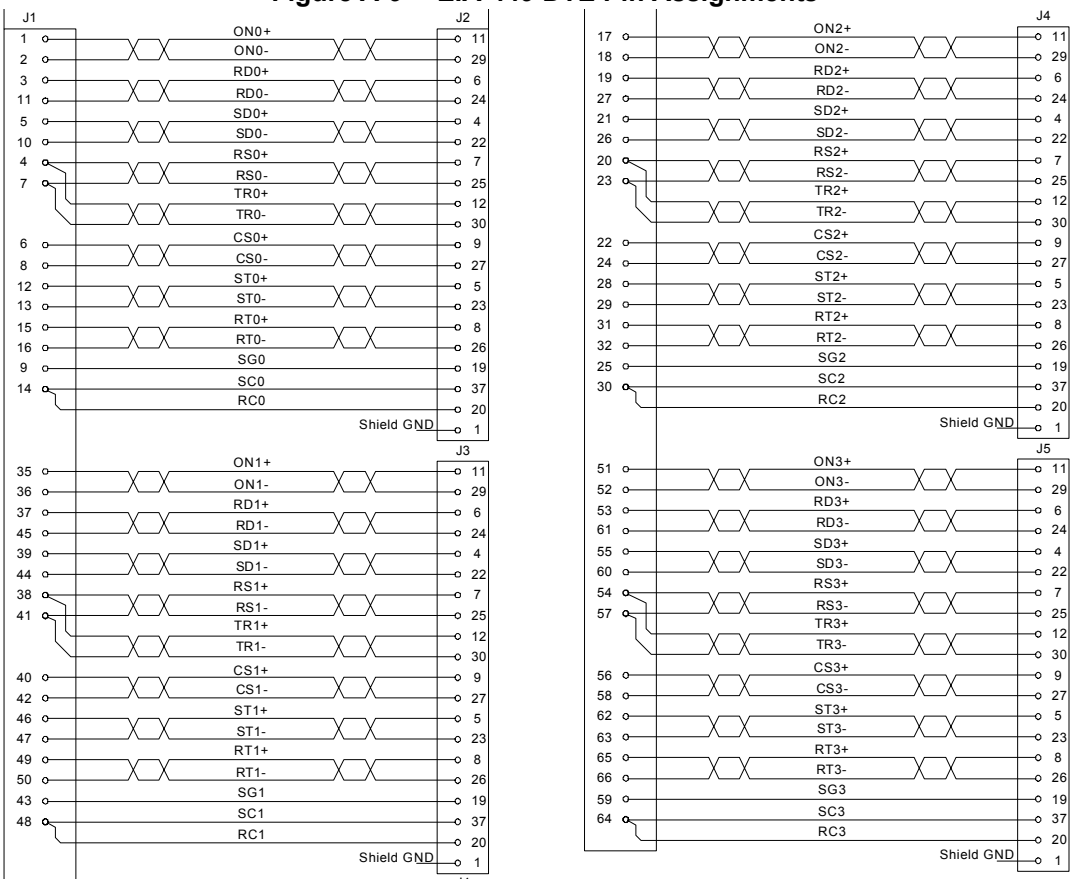
Figure A-8 EIA-232/530 DTE Pin Assignments



J1: 68-pin male SCSI II type connector

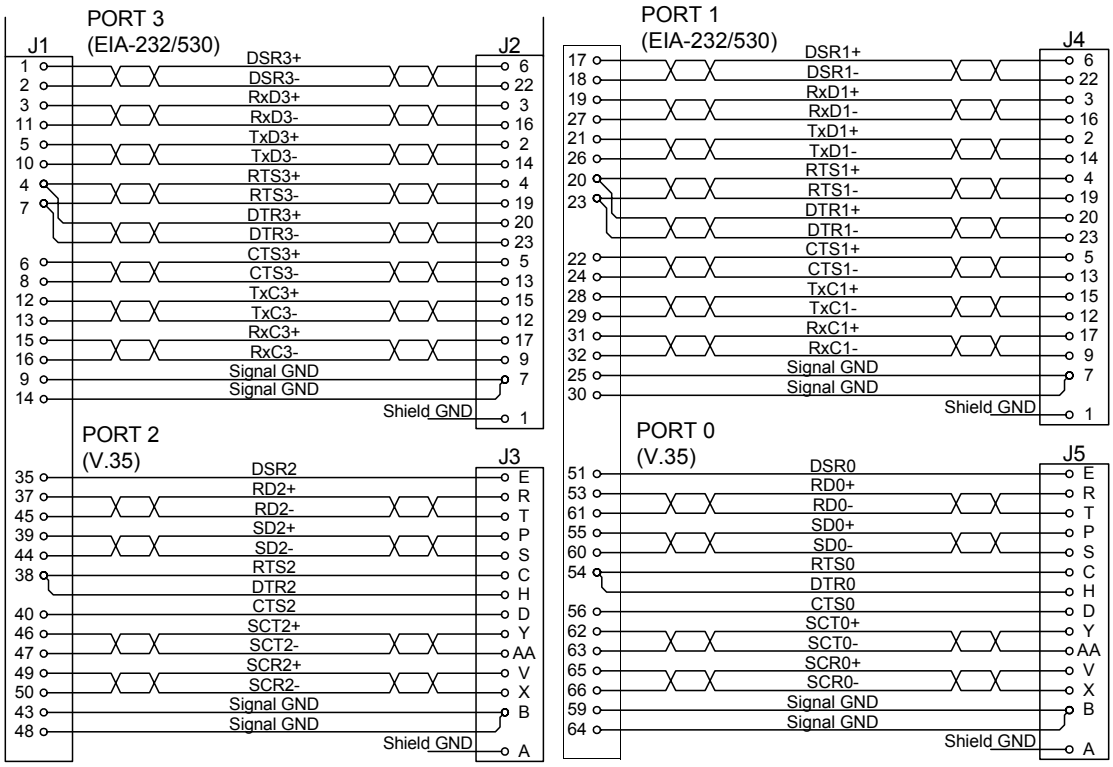
J2 - J5: DB-25 type male connector

Figure A-9 EIA-449 DTE Pin Assignments



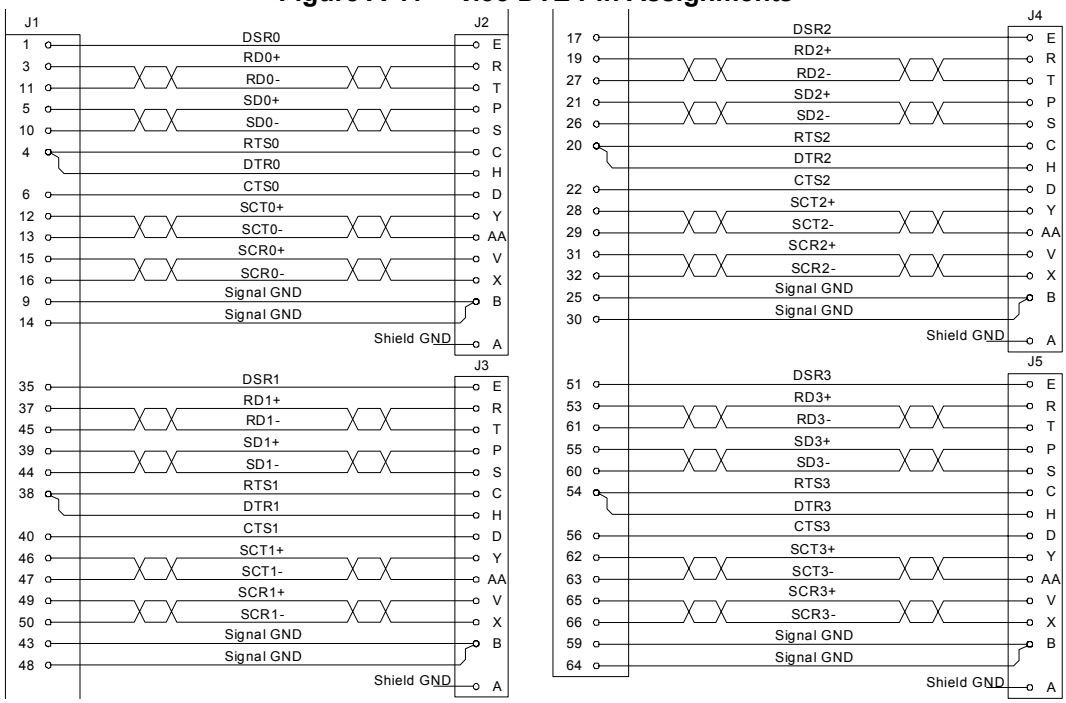
J1: 68-pin male SCSI II type connector
J2 - J5: DB-37 type male connector

Figure A-10 Combined V.35/EIA-232/530 DTE Pin Assignments



J1: 68-pin male SCSI III-type connector
J3, J5: V.35-type male connector
J2. J4: DB-25-type male connector
Pins not shown are unused.

Figure A-11 V.35 DTE Pin Assignments



J1: 68-pin male SCSI II type connector
J2 - J5: V.35 type male connector

T1/E1/ISDN PRI NIM Card Ports

The T1/E1/ISDN PRI NIM, as shown in Figure A-12, comes equipped with either 1, 2 or 4 Ethernet (WAN) ports that support fractional T1/E1 transmission in full-channel, fractional or unchannelized format with 8-pin modular RJ-48C connectors and include a built-in DSU/CSU.

Cables required for these ports must be 100-ohm, straight-through, twisted-pair for T1 lines and a 120-ohm version for E1 lines. Refer to Figure A-13 for pinout assignments.

Note: If you are using the TI/EI/ISDN PRI NIM in Singapore or Australia, the cables required for these ports must not employ individual shields for each pair.

Figure A-12 4-Port T1/E1/ISDN PRI NIM Card (RJ-48C ports shown)

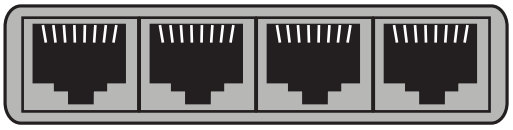
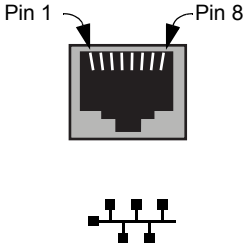


Figure A-13 T1/E1 NIM Port Pinouts

T1/E1/ISDN PRI



Pin	Signal
1	Receive Ring
2	Receive Tip
3	Chassis GND (optional)
4	Transmit Ring
5	Transmit Tip
6	Chassis GND (optional)
7	no connection
8	no connection

Regulatory/Safety Compliance

The T1/E1 ISDN PRI NIM complies with these regulatory requirements: PCI Local Bus Specification Rev 2.1, IEEE P1386 Draft 2.4, IEEE P1386.1 Draft 2.4, ANSI T1.403, ITU-T G.703, G.704, G.706, G.736, G.775, G.823, I.431, Q.703, AT&T TR62411 and TR54016, ETSI ETS 300233, and IEEE 1149.1.

The NIM also complies with the following safety requirements: CS03, FCC Class B, TBR12-14, GR-1089, ITU K17-K20, IEC 61000-4-2, IEC 61000-4-5, UL 1950, IEC 950, and EN 60950.

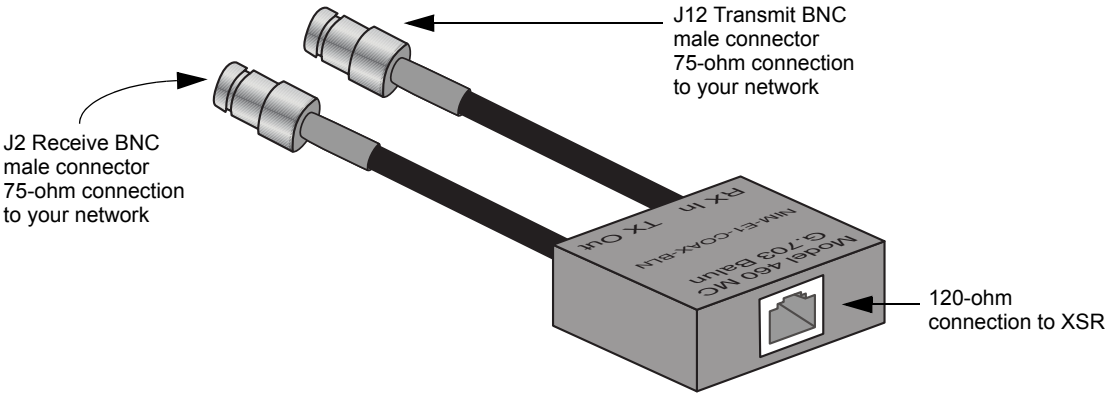
Balun for E1 or PRI NIM Cards

Some overseas electrical systems require that you use a balun and grounding shunt when utilizing an E1 or PRI NIM card on the XSR. A balun is an adapter employed to connect a 75-ohm coaxial cable pair (2 BNC connectors) to a 120-ohm twisted pair cable (RJ-48C connector).

The balun and its connectors are illustrated in Figure A-14. The grounding shunt is also required to ground unused pins of the RJ-48C connector.

To install the balun, attach the 75-ohm coaxial cables to the BNC connectors and a 120-ohm E1/PRI cable to the RJ-48C port (see below for details).

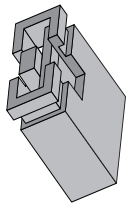
Figure A-14 Balun for E1 or PRI Connection



Grounding Shunt for E1 NIM Cards

If you connect a balun to a 75-ohm line, you will also need to attach a grounding shunt (or terminal strip) to any NIM pins whose RJ-48C connectors utilize the balun. The XSR requires that you use a shunt (shown in Figure A-15), or terminal strip to ground pins 3 and 6 of the RJ-48C interface, which are not needed to complete the connection.

Figure A-15 Sample Grounding Shunt



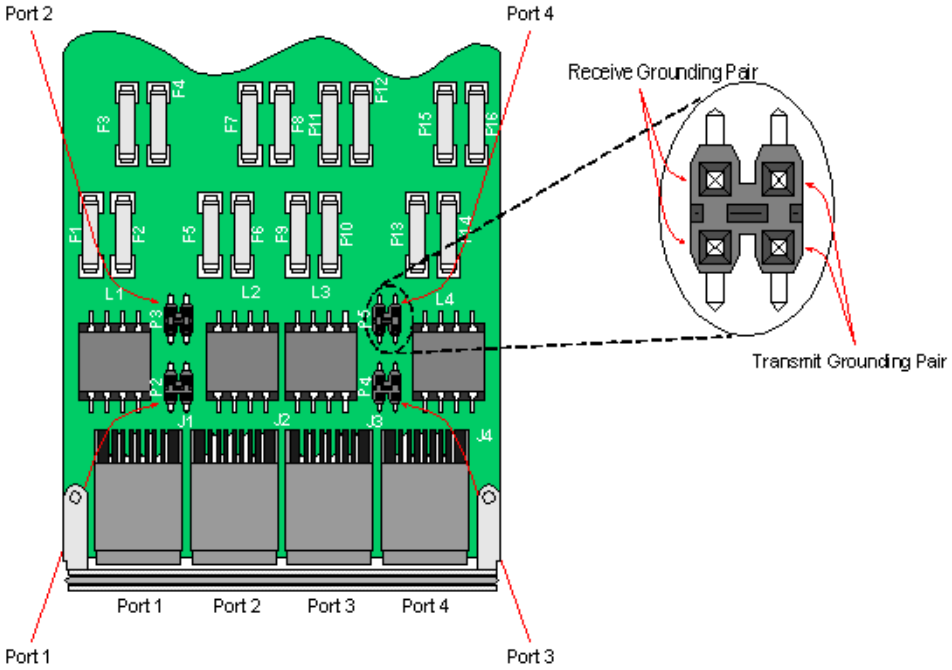
Caution: The cable connecting the E1/ISDN PRI NIM to the balun requires two more wires to extend the chassis ground to the balun. Cables of this type are often provided by your supplier who can customize them to your needs.

Refer to *"Hardware Installation"* on page 2-1 to access the E1 card on the XSR.

Installing Shunt/Terminal Strip

To install the shunt or terminal strip, attach two dual-pin units vertically to each four-pin jumper (P2, P3, P4, or P5) corresponding to the RJ-48C port using a balun, as shown in Figure A-16. Any other RJ-48C ports on the NIM card connected to 120-ohm lines do not require shunts.

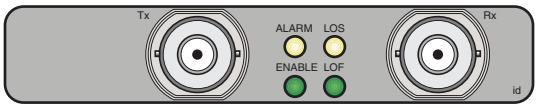
Figure A-16 Installing a Grounding Shunt on the E1 NIM Card



T3/E3 NIM Card

The T3/E3 full and sub-rate NIM, as shown in Figure A-17, is equipped with 1 Ethernet (WAN) port that supports fractional T3/E3 transmission in un-channelized or clear channel mode with BNC connectors. User data are encapsulated in HDLC packets before being sent to the line.

Figure A-17 .1-Port T3/E3 NIM Card



Cables required for this NIM must be 75-ohm, DS3 Type 734 or 735 coaxial. DS3 cables support a length up to 450 in length. E3 cabling supports a cable ble length up to 900 feet.

Un-channelized mode consists of the entire T3/E3 payload in one data path, but with T3/E3 framing bits still in place. Only one HDLC channel is used. Throughput of the un-channelized link can be limited by using only a portion of the entire payload. Various sub-rates are available to provide compatibility with major DSU equipment suppliers. Scrambling may also be enabled as required for DSU compatibility. Larscom zero suppression is supported.

Clear channel mode presents the board merely as the line driver for a link carrying HDLC packets where even framing bits are used for data transfer. The T3/E3 framer operates in bypass mode and renders the NIM a line driver. Both sides of the link must have the same setting to operate correctly in this mode.

For more details on software configuration, refer to the *XSR User's Guide*.

Regulatory/Safety Compliance

The T3/E3 NIM complies with the following regulatory requirements.

E3: FCC Class B, ITU-T G.703, G.704, G823 and TBR24 for world wide approval, National Standards testing as required, and BABT Compliance United Kingdom directive 607114.

T3: FCC Class B, GR-499-CORE is the Bellcore test procedure that can be used for design validation, JATE Green Book for Japan.

1/2-Port ISDN BRI-S/T NIM Card Ports

The XSR offers a serial NIM card for 1 or 2 WAN interfaces over an ISDN BRI-S/T line, as shown in Figure A-18. The Port 0 and 1 LEDs shine when the lines are active and ready to receive traffic. See Figure A-19 for pinout assignments.

Figure A-18 ISDN BRI-S/T NIM Card (RJ-45 ports shown)

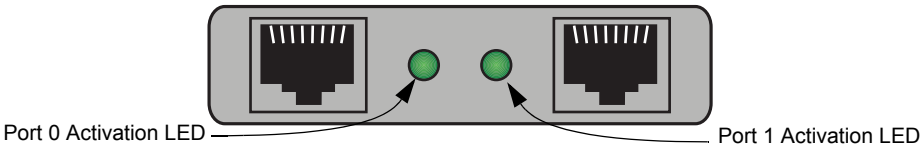
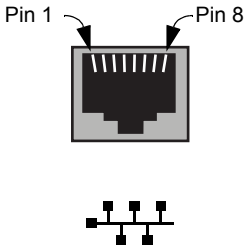


Figure A-19 ISDN BRI-S/T NIM Pinouts

BRI-S/T



Pin	Signal
1	Unused
2	Unused
3	Transmit (+)
4	Receive (+)
5	Receive (-)
6	Transmit (-)
7	Unused
8	Unused

Termination Shunt for the ISDN BRI-S/T NIM Card

ISDN BRI-S/T terminal equipment devices may be connected at random points of the cable in point-to-point or point-to-multipoint configurations. Line termination resistors must be provided at both ends of the transmit/receive lines only.

The XSR's BRI NIM card provides an option to terminate receive as well as transmit lines using 100 Ohm resistors. Shunts are required to shorten the appropriate contacts of the terminal headers (P1, P2). Refer to "Installing Shunt/Terminal Strip" on page A-18 for directions.

Figure A-20 shows per port respective termination header locations and the orientation of the receive and transmit pairs.

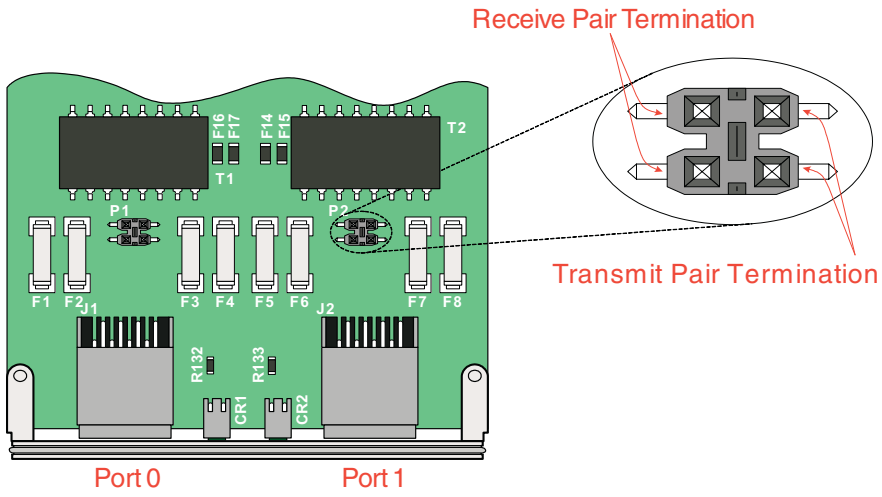
Caution: The cable connecting the BRI NIM to the balun requires two additional wires to extend the chassis ground to the balun. Cables of this type are often provided by your supplier who can customize them for your needs.

Refer to *Chapter 2* in this manual for directions on accessing the BRI card on the XSR.

Installing Shunt/Terminal Strip

To install the shunt or terminal strip, attach two dual-pin units vertically to P1 and P2 four-pin jumpers corresponding to the RJ-45 port using a balun, as shown in Figure A-20. Any other RJ-45 ports on the NIM card connected to 120-ohm lines do not require shunts.

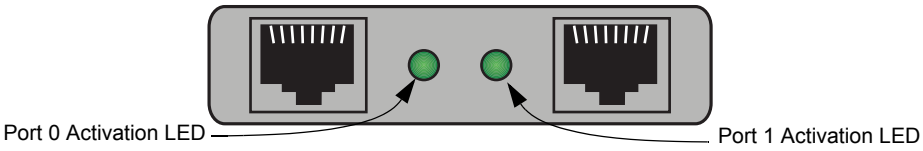
Figure A-20 Installing a Termination Shunt on BRI-S/T NIM Card



1/2-Port BRI-U NIM Card Ports

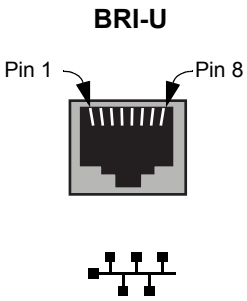
The XSR provides a serial NIM card for 1 or 2 WAN interfaces over an ISDN BRI-U line, as shown in Figure A-21. The Port 0 and 1 LEDs shine when the lines are active and ready to receive traffic. .

Figure A-21 ISDN BRI-U NIM Card (RJ-49C ports shown)



Refer to Figure A-22 for pinout assignments.

Figure A-22 ISDN BRI-U NIM Pinouts



Pin	Signal
1	Unused
2	Unused
3	Unused
4	Signal (Tip)
5	Signal (Ring)
6	Unused
7	Unused
8	Unused

Regulatory/Safety Compliance

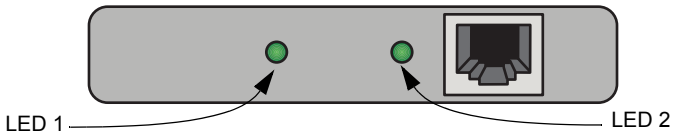
The ISDN BRI-U NIM complies with the following regulatory requirements: PCI Local Bus Specification Rev 2.2, IEEE P1386 Draft Rev 2.4, IEEE P1386.1 Draft Rev 2.4, ANSI T1.601-1999, and IEEE 1149.1.

The NIM also complies with the following safety requirements: FCC Part 68, CS03, FCC Class B, UL 1950, IEC 950, and EN 60950.

1-Port ADSL NIM Card Port

The XSR's Asymmetric Digital Subscriber Line (ADSL) NIM card, as shown in Figure A-23, provides 1 WAN port on an ADSL over POTS (Annex A/C) or ISDN (Annex B) line with a 6-pin RJ-11 connector. The ADSL NIM supports both G.dmt and G.lite standards. ADSL NIMs are shipped with a CompactFlash card containing DSP firmware. This driver software copies the Flash file into host memory where it provides on-demand use by the DSP.

Figure A-23 ADSL NIM Card

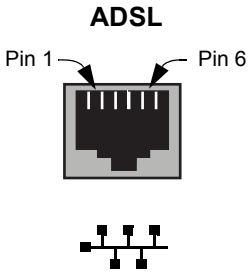


Note: The XSR supports only one ADSL card type at a time, so multiply-installed card types must be similar.

The LEDs behave as follows: LED 1 - *Status* - When OFF, the line is down; when ON; the line has ended "training" or synchronization with the remote DSLAM device and is operational; when Flashing, the line is in training mode; LED 2 - *Data* - When flashing, traffic is active.

Refer to Figure A-23 for pinout assignments.

Figure A-24 ADSL NIM Pinouts



Pin	Signal
1	Unused
2	Unused
3	Signal (Tip)
4	Signal (Ring)
5	Unused
6	Unused

Regulatory/Safety Compliance

The ADSL NIM complies with the following regulatory requirements: EN 55022, EN 55024, FCC Part 68, CS03, TIA/EIA-IS-968, T1.413, ITU G.992.1, ITU G.992.2, ITU G.991.2, ITU G.994.1, Deutsche Telecom U-R2 specifications and ANSI Standard T1.413-1998 (issue 2) specifying full rate ADSL.

The ADSL NIM also complies with the following safety requirements: UL 1950, CSA No. 950, EN 60950, and IEC 950 (CB Scheme Report).

T1/E1 Drop & Insert (D&I) NIM

The XSR's 2-port T1/E1 D&I NIM card, as shown in Figure A-25, is designed as an intermediary between the Central Office T1/E1 line and a PBX. It de-couples Channel Associated Signaling (CAS) and Voice DS0 timeslots and redirects them to a PBX, and conversely, reintegrates Voice DS0 timeslots from the PBX with the T1/E1 data stream. Both ports are functionally equivalent.

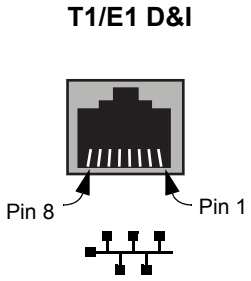
Figure A-25 T1/E1 D&I NIM Card

The T1/E1 D&I NIM provides long- and short-haul capabilities and Drop and Insert functionality via a fully configurable Time Division Multiplexed (TDM) switch. It can be configured for data only, or voice/data applications. In Data-Only mode, both ports pass data, whereas in Voice/Data mode, one port passes a voice/data stream, while the other passes only voice.

The T1/E1 D&I NIM maintains high reliability of voice traffic by using a bypass relay to ensure continued service even if a power failure occurs or the NIM enters an abnormal state. In such an event, the two ports are connected, bypassing the NIM, thus allowing uninterrupted bidirectional voice transmission. To ensure service, remember to configure voice timeslots on both sides of the connection in the same manner. That is, if timeslots 3-5 are configued for voice on the NIM, the same DS0s should be configured for voice at the Central Office. Refer to the *XSR User's Guide* for instructions.

Refer to Figure A-26 for pinout assignments.

Figure A-26 T1/E1 D&I NIM Pinouts



Pin	Signal
1	Unused
2	Unused
3	Unused
4	Signal (Tip)
5	Signal (Ring)
6	Unused
7	Unused
8	Unused

Regulatory/Safety Compliance

The T1/E1 D&I NIM complies with the following regulatory requirements: PCI Local Bus Specification Rev 2.1, IEEE P1386 Draft 2.4, IEEE P1386.1 Draft 2.4, ANSI T1.403, ITU-T G.703, G.704, G.706, G.736, G.775, G.823, I.431, Q.703, AT&T TR62411, TR54016, ETSI ETS 300233, and IEEE 1149.1.

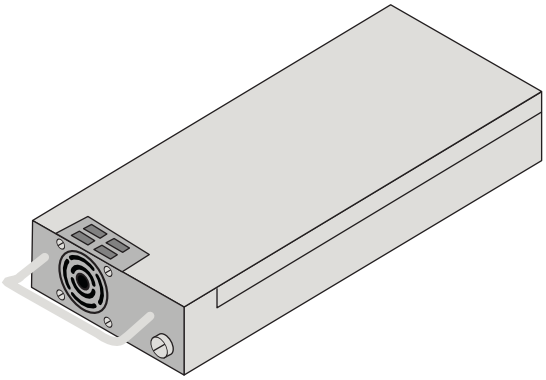
The T1/E1 D&I NIM also complies with the following safety requirements: FCC Part 68, CS03, FCC Class B, TBR12, 13, 14, GR-1089, ITU K17-K20, IEC 61000-4-2, IEC 61000-4-5, UL1950, IEC 950, and EN 60950.

XSR-1850 Redundant Power System

The optional XSR-1850 Redundant Power System, as shown in Figure A-27, is an external, supplemental power source. This 50-watt, AC to DC power supply is a redundant unit which is operated in parallel with the standard internal power supply, with which it shares power buses. The power system requires no configuration - it begins operating when all cables are connected.

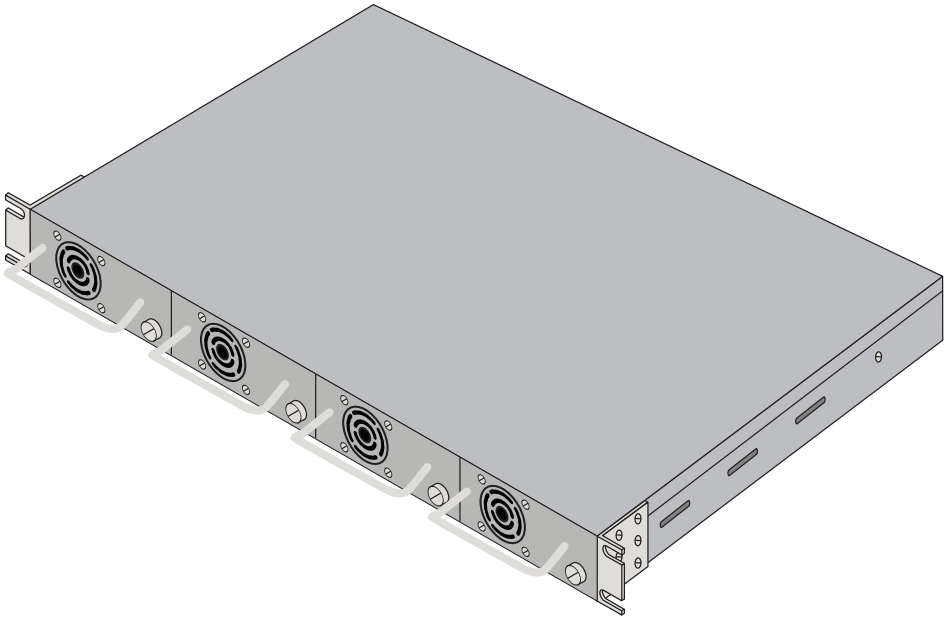
The power system utilizes a droop sharing scheme such that at greater than 50% of a full load, plus or minus 10%, each supply delivers 50% of the required load for 5.1 volt output. Passive current sharing proveds 50%, plus or minus 30%, of the system load required for +12 and -12 volt outputs. It also features over-voltage, over-current, and short-circuit protection including a 250 volt minimum fuse.

Figure A-27 XSR-1850 Redundant Power System



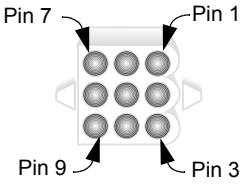
Up to four power supplies can be installed in the 1U Passive Power Chassis, as shown in Figure A-28, which can be rack mounted. Two-foot long DC power harnesses are provided to attach XSRs and the power chassis, as well as a standard, 2-meter shielded power cord for the chassis-to-wall outlet connection. Power supplies are hot swappable and are equipped with a built-in fan which extends the unit's lifespan but are not essential for normal functionality.

Figure A-28 Passive Power Chassis (Fully Loaded)



Refer to Figure A-29 for chassis DC output pinout assignments.

Figure A-29 Passive Power Chassis DC Output Pinouts



Pin	Signal
1,2	+5.1V
4	-12V
5	+12V
3,7	COMMON
8	(+) 5.1V sense
9	(-) 5.1V sense
6	N/C

For instructions on installing the Redundant Power System, refer to the *Hardware Installation* chapter on page 2-1.

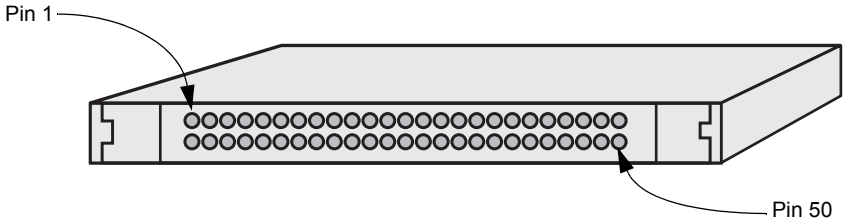
CompactFlash Memory Card

The optional plug-in CompactFlash (CF) memory card, shown in Figure A-30, comprises a single chip controller and flash memory modules in a matchbook-sized package with a 50-pin, PCMCIA connector consisting of two rows of 25 female contacts each.

The PCMCIA male interface supports both Type I and Type II CF cards. Note that the CF release mechanism pops out when you install the card.

For instructions on installing the CompactFlash card, refer to the *Hardware Installation* chapter in this manual.

Figure A-30 CompactFlash Memory Card



LED Behavior

The ten LEDs located on the XSR front panel display system and port status as described in the Table A-3 and illustrated in Figure A-31.

Figure A-31 XSR LEDs

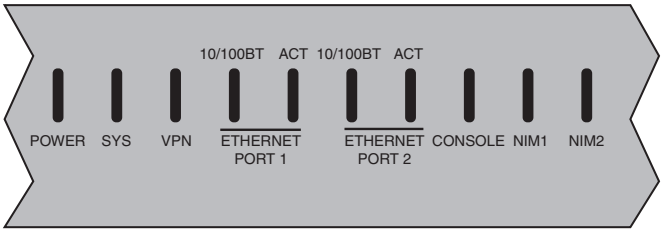


Table A-3 LED Description

LED	State	Function
POWER	ON	3.3V power is present
SYS(tem Status)	ON/OFF	XSR is operational/malfunctioning due to hardware or bootrom problem
	Blinking slowly	Flash update is in progress (software image downloading), warning you not to power down the XSR. Powering down now can leave the branch router without valid software.
VPN	ON/OFF	VPN tunnel is connected/disconnected
ETHERNET PORT 1/2	ON/OFF	10 or 100BaseT link is auto-detected/down
Ethernet 1/2 ACT(ivity)	Blinking	Port is transmitting or receiving data
CONSOLE	Blinking	Port is transmitting or receiving data
NIM 1, 2	ON	T1/E1, ISDN or HSSI link up
	OFF	NIM slot empty or link not functioning
BRI NIM Port 0, 1	Cnctd to switch	BRI link is activated and ready for traffic. This LED is located on the NIM card.
ADSL NIM 1	Blinking	Line is in training mode (syncing with DSLAM)
	ON/OFF	Training mode complete, line is operational/line down
ADSL NIM 2	Blinking	Traffic activity in sync with data traffic
T3/E3 NIM: •LOS (Loss of Signal) •LOF (Loss of Frame) •Alarm •Enable	 Red ON Red ON Amber ON Green ON	 XSR cannot latch onto the frequency Both sides of link cannot synchronize frames Error condition detected Link is up and running
Copper Ethernet NIM	Link ON Link OFF Activity Blinking	100Base-T link is auto-detected 10Base-T link is auto-detected Port is transmitting or receiving data
Fiber-optic Ethernet NIM	Link ON Activity ON	100Base-F link is auto-detected Port is transmitting or receiving data

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